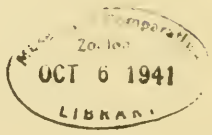
TRANSACTIONS

OF THE

SAN DIEGO SOCIETY OF NATURAL HISTORY

VOLUME IX, No. 29, pp. 289-332, plates 12-13, map

THE LONG-NOSED SNAKES OF THE GENUS RHINOCHEILUS



BY

LAURENCE M. KLAUBER

Curator of Reptiles and Amphibians, San Diego Society of Natural History

---

SAN DIEGO, CALIFORNIA

PRINTED FOR THE SOCIETY

SEPTEMBER 26, 1941

TABLE OF CONTENTS

THE LONG-NOSED SNAKES OF THE GENUS RHINOCHEILUS

BY

LAURENCE M. KLAUBER

Curator of Reptiles and Amphibians, San Diego Society of Natural History

INTRODUCTION

The long-nosed snakes, or, as they are sometimes quite as appropriately called, the sharp-nosed snakes, belonging to the genus *Rhinocheilus* are nocturnal snakes found in the western United States and northern Mexico. While they are moderately common in many regions, their secretive habits had prevented the acquisition of large series for study until the advent of new methods of collecting, especially by cruising in an auto on desert roads at night. Adequate series are now available from several areas and it therefore appears desirable to summarize our present knowledge of the genus, to determine the validity of the forms hitherto proposed, and whether additional species or subspecies may be recognized.

HISTORICAL SUMMARY

The following forms have been described:

Rhinocheilus lecontei Baird and Girard, 1853, Catalogue of North American Reptiles, Part I, Serpents, p. 120. Type locality: San Diego, California. Type specimen: MCZ 137.

Rhinocheilus lecontei var. *tessellatus* Garman, 1883, Memoirs of the Museum of Comparative Zoölogy, Vol. 8, No. 3, p. 74. Type locality: Monclova, Coahuila, Mexico. Type specimen: MCZ 4577. Distinguishing characteristic: low ventral scale count.

Rhinocheilus antonii Dugès, 1886, Proceedings of the American Philosophical Society, p. 290. Type locality: San Blas near Mazatlán, Sinaloa, Mexico. Type specimen in Museo Alfredo Dugès, Guanajuato, Mexico. Distinguishing characteristic as reported by describer: 17 dorsal scale rows.

Rhinocheilus thominotii Bocourt, 1887, Le Naturaliste, Ser. 2, Vol. 1, p. 45. Type locality: Venezuela. Type specimen: No. 6615, Museum National

d'Histoire Naturelle, Paris. Distinguishing characteristics: long tail and high caudal scale count.

Thus four species and subspecies have been described, but, as far as the genus *Rhinocheilus* is concerned, we need consider only three. I have communicated with Mr. F. Angel, concerning some of the characters of the last named form, *thominotii*. He states that Mocquard had made an entry in the catalogue of the Paris collection to the effect that he considered the type to be a specimen of *Scytale coronatum* (which species is now known as *Pseudoboa coronata*). He himself has carefully re-examined it, made comparisons with other material, and finds it to be a juvenile specimen of *Pseudoboa neuwiedii*. As far as I am aware, no specimen of the supposed *R. thominotii* except the type has ever been reported or collected. *R. thominotii* may therefore be considered a synonym of *P. neuwiedii* and need receive no further consideration. *Pseudoboa* is a genus differing from *Rhinocheilus* in its possession of grooved maxillary fangs.

Preliminary Survey of Variation

Rhinocheilus comprises a genus notably constant in lepidosis and variable in pattern. Amongst the Nearctic colubrids it is unique in having the majority of the subcaudal plates undivided. The pattern is remarkable for a peculiar and rather characteristic inversion of colors. The most widely distributed of the subspecies (*lecontei*) is primarily a ringed snake with alternating red and black rings upon a cream ground-color; but laterally the centers of the black scales are usually red or cream, while the centers of the red or cream scales are black. Not only is a taxonomic study of the genus complicated by the pattern variability, but there is also an ontogenetic change in pattern, for the lateral areas are lighter and less punctated in the young. The red patches or blotches, characteristic of the snakes of some regions, fade quickly, even with careful preserving; this is especially true of the young, and must be kept in mind to avoid confusion in diagnosis. Sometimes the lateral dark spots also disappear in preservative.

In beginning the survey of a genus I find it always desirable to make two determinations with respect to the largest homogeneous series which may be available from any restricted locality: first, the extent to which sexual dimorphism affects the characters which are to be used in classification; and, secondly, the degree of variation exhibited by the snakes of a single region. If these initial determinations are not made, conclusions may be quite erroneous by reason of the chance composition of the samples—the particular specimens—available to us. For example, we may find significant differences between the average ventral scale counts of the snakes of two areas; but it may happen that most of the specimens from one region are females, while from the other they are predominantly males. Obviously under such circumstances average differences are to be expected if the genus is sexually dimorphic in ventrals; but this is merely a proof of sexual dimorphism and not of regional differentiation. This consideration is sometimes neglected in studies even today, no statement being made either as to the sexual composition of the samples, or whether sex differences are important.

As to the second point, determining the extent of variation in one locality is advisable in order to have some idea of the plasticity of the characters to be studied. Unless this be done it is difficult or impossible to tell whether observed differences are regional (and therefore possibly subspecific) or only individual.

In large genera it is preferable to make determinations of this kind in several species, for characters may be found to vary differently, although there is generally a trend toward uniformity in the nature of character dispersion within a genus.

In *Rhinocheilus* we have available for study a series of specimens from coastal San Diego County, an area including and adjacent to the type locality of *lecontei*. This comprises some 37 males and 25 females. The statistics with respect to possible sexual dimorphism are shown in the following table:

	Ventrals	*Subcaudals*	*Body Blotches*	*Tail Spots*
Mean, males	207.05	51.61	31.44	11.28
Mean, females	203.60	45.41	28.60	10.09
Difference	3.45	6.20	2.84	1.19
Significance of difference, P	.0001—	.000001—	.0011	.019
Coefficient of divergence, %	1.68	1.28	9.46	11.13

In explanation of the calculations leading to the determination of the significance and coefficient of divergence it should be stated that the first was calculated by the method of pooling and the *t*-test. The value of *P* sets forth the chance that the observed difference might have resulted from a mere accident of sampling, rather than a real difference between the sexes. It will be observed that the results are much below one chance in a hundred in all characteristics except the tail spots, and in this case the probability that the discrepancy is due to chance is only 2 in a hundred. The coefficient of divergence is a measure of the extent of the difference, independent of its significance, and is defined as the difference between the means divided by the mean of the means, expressed as a percentage.

These results indicate that sexual dimorphism is present in all four characters in this homogeneous series of specimens. It is most significant in the scale counts, and least in pattern, yet its extent is greater in the latter. This seeming inconsistency is, of course, due to the wider dispersions of the pattern characters, as indicated by the coefficients of variation subsequently set forth.

These sex differences are found to be consistent throughout the genus. It is worthy of note that the males exceed the females in ventral scutes, a condition opposite to that obtaining in most colubrids. Also, the adult males are found to be larger than the females, which is likewise unusual; these two peculiar traits may be correlated.

I have been unable to find any other sexually dimorphic character in the genus, except, of course, the proportionate tail length. Some genera have sex differences in the average number of dorsal scale rows but this condition is not

evident in *Rhinocheilus*.

We come now to the preliminary study of the dispersion in these same characters. It is to be remembered that these statistics are based on 37 males and 25 females:

		Males	*Females*
Ventrals,	range	202–213	198–211
	interquartile range	204.9–209.2	201.1–206.1
	mean	207.05∓.53	203.60∓.74
	coefficient of variation, %	1.56∓.06	1.82∓.08
Subcaudals,	range	49–58	43–51
	interquartile range	50.1–53.1	43.9–46.9
	mean	51.61∓.42	45.41∓.49
	coefficient of variation, %	4.26∓.18	5.02∓.24
Body blotches,	range	25–38*	24–37
	interquartile range	29.3–33.6	26 3–30.9
	mean	31.44∓.53	28.60∓.67
	coefficient of variation, %	10.24∓.39	11.77∓.53
Tail spots,	range	8–16	8–15
	interquartile range	10.1–12.5	9 0–11.2
	mean	11.28∓.33	10.09∓.36
	coefficient of variation, %	15.90∓.68	16.74∓.87

Thus we find in this genus that the coefficient of variation of the ventrals is somewhat below 2 per cent and of the subcaudals about 5 per cent. The variations in pattern are much higher—10 to 12 per cent in the body blotches and 15 to 17 per cent in the tail spots. These results are consistent with those found in other colubrid genera such as *Lampropeltis*, *Phyllorhynchus*, and *Trimorphodon*, provided the specimens tested are from a restricted locality rather than from a widespread region. If they are not so restricted the coefficients are likely to be higher.

These dispersions once more indicate the stability of ventral scale counts and the greater plasticity of pattern. Although sexual dimorphism has been shown to be present in the numbers of body blotches and tail spots I found that the differences, which are not great, would introduce too much complication into the discussion of subspecific segregations, therefore I have not subsequently differentiated the sexes in these characters. I should merely point out that the overlap between subspecies would be somewhat less if the sexes were separated.

Rhinocheilus is a genus in which accurate sexing, particularly in the juveniles,

* Omitting one freak specimen with 48. The use of the sign ∓ in this table indicates that the following figure is the standard, not the probable, error.

is often difficult. Neither the tail ratio nor the number of subcaudals is a certain criterion, since there is some overlapping. If any errors have been made in sexing, the effect will have been to increase the coefficients of variation (and to decrease the coefficients of sexual divergence) below their true values in the statistics subsequently presented.

Other characters besides those given, that is, scale rows, labials, oculars, etc., do not have the type of variation in this genus that lend themselves to a statistical study involving mean differences; the significance of differences may be ascertained by an Rx2 test.

Another *Rhinocheilus* peculiarity, besides the undivided subcaudals, larger males, higher number of ventrals in males, and the pattern inversion, is the variability of the apical scale pits, which may number one in some scale rows and two in others, or may, in fact, vary within a single row.

TAXONOMIC SURVEY

It will be recalled that two species (three subspecies) have been described:

R. lecontei from coastal southern California.
R. l. tessellatus from northeastern Mexico.
R. antonii from the west coast of Mexico.

Taking as a basis the variability data, hitherto set forth for a homogeneous series of *lecontei* from near the type locality, I find that *tessellatus* may be given subspecific recognition on several differences from *lecontei*, among which may be mentioned a differently shaped snout, fewer ventrals, and a relatively longer tail.

Antonii is likewise a valid subspecies, although not differentiated by the character (number of dorsal scale rows) which was emphasized in the original description. Other specimens more recently collected in the same area have failed to check with the type in this character; this was given by Dugès as 17 for the type of *antonii*, while the later acquisitions have 23. I had suspected that the original description was in error and now this is definitely known to be the case; fortunately the type has been studied by Dr. Hobart M. Smith, and he has kindly supplied me with the results of his inspection, showing the scale rows to be 23 instead of 17. But while this character fails, the pattern of *antonii* is quite distinctive from that of either *lecontei* or *tessellatus*, there being fewer and relatively longer body blotches, and there are other differences as well, so that it remains valid. However, there is intergradation with the adjacent form to the north and thus *antonii* must be reduced to subspecific status.

In addition to these three subspecies already described, I find the recognition of a fourth, from the deserts of the southwest, to be warranted. All four exhibit intergrading series with at least one of the others; hence, as far as is now known, the genus is monotypic.

Altogether about 400 specimens have been available for study. Since the descriptions of the several forms will tend to clarify the conclusions, the

descriptions are given next, followed by a summary of subspecific differences and relationships.

Rhinocheilus lecontei lecontei Baird and Girard

Western Long-nosed Snake

Plate 12, fig. 1.

1853. *Rhinocheilus Lecontei* Baird and Girard, Cat. North Am. Rept., Part 1, Serp., p. 120. Type specimen: MCZ 137. Type locality: San Diego, California.
1859. *Rhinocheilus lecontii* Baird, Pac. R. R. Surv., Vol. 10, p. 15.
1866. *Rhinochilus lecontei* Cope, Proc. Acad. Nat. Sci. Phila., Vol. 18, p. 304.
1883. *Rhinochilus leconteii* (part) Yarrow, Bull. U. S. Nat. Mus. No. 24, pp. 14 and 88.

Diagnosis.—A subspecies characterized by a high number of dorsal blotches and much spotting of the lateral areas, which characters of pattern segregate this form from both *antonii* and *clarus*. It has a blunter and less up-tilted snout than *tessellatus*.

Range.—California from Mendocino and Lassen counties south; northern Lower California, southwestern Idaho, Nevada, southwestern Utah, southern and western Arizona. Replaced by *clarus* in certain desert areas in southern California and western Arizona.

Material.—The survey of this subspecies is premised on material distributed as follows:

Lower California	5
California	160
Nevada	8
Utah	6
Idaho	1
Arizona	55
Total	235

Redescription of Type Specimen.—MCZ 137, from San Diego, California. A young adult male with an incomplete tail. There are 23 dorsal scale rows at mid-body; 205 ventrals; 40 (incomplete count) subcaudals, all entire. The anal is undivided. The supralabials are 8–8 and the infralabials 9–9. The nasals are 2–2, loreals 1–1, preoculars 1–1, postoculars 2–2, temporals 2+3. The length over-all is 533 mm. and the incomplete tail 63 mm. There are 26 body blotches and 6 on the tail. The main black blotches are of solid black on the dorsum, with lateral triangular extensions down the sides. There are smaller secondary black blotches interspersed between the primaries on the sides. The primaries touch the ventrals. Laterally the dark scales of the main blotches have light centers. In the interspaces there are many brown centered scales, particularly on the sides; these spots were probably black in life. The dark dorsal blotches

slightly exceed the interspaces in longitudinal extent. The red of the interspaces (mentioned in the original description) has now disappeared. The type, in all important characters, is fairly representative of the species as found in the vicinity of San Diego.

Morphology.—The body is of normal colubrid proportions, neither racer-like nor heavy bodied. The tail is relatively short. The head is only slightly distinct from the neck, with the temporal regions a little widened. Viewed from above the head is wedge-shaped, but it is rounded, not pointed, at the rostral. In profile the snout is considerably more pointed, the rostral being rather sharp, with the lower jaw short and deeply inset. The prefrontal-internasal line is straight or convex. The eyes are neither large nor protuberant. The diameter of the eye is about 60 per cent of the distance from the orbit to the nostril. The pupil is round; the iris in life is brown or red-brown. The tongue is black with light tips. The longest specimen at hand measures 892 mm.; the tail is incomplete so that without doubt this subspecies reaches a length of at least 900 mm. The longest specimens are males; thus 14 males of this subspecies exceeding 800 mm. are at hand, but the longest female is only 755 mm. Young specimens just hatched measure about 210 to 220 mm.; the smallest is 202 mm.

The tail length of the males averages about 14 per cent of the length over-all; the range is from 13.2 to 14.9 per cent. There is no evidence of a change in the tail-length ratio with age, as is the case in some colubrid genera. The females average 13 per cent; nearly all fall between 12.1 and 14.0 per cent. Thus there is some overlapping, and the tail-length ratio cannot be used to segregate the sexes.

The head length in adults is about 2.7 to 2.9 per cent of the body length over-all.

Scutellation.—The body is covered with smooth and imbricate scales with rounded posterior tips. Apical scale pits seem to be irregular, being sometimes present, sometimes absent. When present there are usually two on the lowest two lateral rows, and one on the others. But in one specimen there are two on some scales and one on others of a single row (the fourth). There are usually 23 scale rows at mid-body, only a few specimens (2 per cent) having 25; rarely a specimen is found with 22 or 24. On the neck the rows often number 25 even though there are only 23 at mid-body. Anterior to the vent they reduce to 19 or, rarely, to 17. The reduction from 25 (when present) proceeds in accordance with the following formula 25-V-23-VI-21-V-19. Occasionally the VI row is dropped between 25 and 23.

The data on the ventrals are as follows: Males (127 specimens)—extreme range 190 to 217, interquartile range 203.0 to 209.6, mean 206.28 ∓ 0.43, coefficient of variation 2.73 per cent; females (75 specimens)—maximum range 186 to 212, interquartile range 197.5 to 205.2, mean 201.31 ∓ 0.66, coefficient of variation 2.83 per cent. These variations are seen to be greater than were found in the sample limited to western San Diego County. The coefficient of sexual divergence is 2.44 per cent.

The subcaudals vary as follows: Males (113 specimens) range from 48

to 60, interquartile range 50.1 to 52.8, mean 51.45∓0.19, coefficient of variation 3.89 per cent. The corresponding figures for the females (67 specimens) are—extreme range 41 to 51; interquartile range 43.8 to 46.7, mean 45.28∓0.26, coefficient of variation 4.78 per cent. The coefficient of sexual divergence is 12.8 per cent. The majority of the subcaudals are usually undivided, a generic characteristic unique amongst colubrids in the United States. However, there are always a number divided; these may vary from a few to as many as half the series. Ordinarily, the divided scales are concentrated toward the end of the tail and it is rare indeed that the last few scales are undivided. However, divided scales, either singly or in groups, may be scattered almost anywhere in the series, as for example in these three typical males: 37e, 4d, 2e, 7d; 1d, 43e, 1d, 3e, 1d, 1e, 8d; 2d, 36e, 13d (e, entire; d, divided). The anal plate is entire.

The rostral is prominent, sometimes with the edges slightly raised above those of the contiguous scales. It is somewhat wider than high, recurved and with a deep longitudinal hollow below. Posteriorly it is sharply pointed and separates the internasals for about half their depths. The internasals are quadrangular, with the outer points lying between the rostral and prenasals. The prefrontals curve downward on the sides of the head; they are wider than high. The frontal is hexagonal and narrows posteriorly; it is longer than wide. Posteriorly it separates the parietals for a short distance. The supraoculars are relatively small and do not jut over the eyes; anteriorly they narrow to a point where they contact the prefrontals, thus preventing contact between the frontal and preoculars. The parietals are broadly in contact; they narrow posteriorly.

The nasals are small and are divided into anterior and larger posterior sections by a diagonal suture passing through the nostril. The loreal is about twice as long as high; 4 per cent of the specimens have two loreals, and one specimen (out of 200) has 3 loreals on one side. There is usually a single preocular which is higher than wide; 5 per cent of the specimens have two preoculars. There are two postoculars (rarely 1 or 3) the upper being slightly the larger. The temporals usually are 2+3 but there may be 1+2, 1+3, 2+2, 2+4, or 2+5. The upper temporal may be very long; usually it contacts both postoculars.

The supralabials vary from 6 to 9, with the following distribution in a total count of 418 in this series; 6 (1), 7 (23), 8 (378), 9 (16). Usually the seventh is the largest; the fourth and fifth are in contact with the eye. The infralabials number from 8 to 11, with 9 predominating. Five per cent have 8, 18 per cent have 10, and one per cent has 11. The first pair contact on the mid-ventral line, the first three (occasionally four) contact the pregenials; the fifth is the largest.

The mental is small and triangular. The pregenials are much larger than the posterior. The latter are usually divided longitudinally so that they are not sharply distinguished from the gulars. There are usually 4 scales (end to end) between the pregenials and the first ventral, and 6 or 7 rows between the first ventral and the last infralabial.

Pattern and Color.—In *lecontei,* as is the case in *tessellatus,* the pattern emphasizes the peculiar color inversion for which these subspecies are notable.

The dorsal pattern consists of some 30 black blotches on a cream or yellowish background. The blotches occupy a longitudinal space of about one and a half times that of the interspaces, although in some specimens the two are approximately equal. The dark blotches and the light spaces which separate them are of solid color on three to five central dorsal scale rows only. Laterally the scales of the black blotches are increasingly occupied with cream centers, and the scale centers of the interspaces increasingly marked with black, just as if the colors had been transposed. In almost all cases the interspaces, especially dorsally, are heavily clouded or marked with pink, scarlet, or carmine. As the reddish color fades in preservative it will often be absent in pickled specimens; this is especially true of juveniles, which are generally black and cream, but may have been quite red in life. In addition the black markings in the lateral interspaces are apparently not attained until the adult stage, so that the juveniles of *lecontei* are much like *clarus,* save in the number and shape of the blotches.

On the sides the dark dorsal blotches narrow irregularly as they approach the ventrals, and a series of interspersed secondary blotches becomes increasingly prominent. The sides are sometimes so uniformly mottled with black-centered scales as to obscure the pattern. In the juveniles it can be seen that the main blotches are more pointed laterally in *lecontei* than in *clarus,* but the increased pigment in the adults of *lecontei* tends to obscure this effect.

The frontal, supraoculars, and the parietals are usually marked with light cream on the edges but are dark toward the center. The rostral, internasals, and prefrontals are generally dark only at the edges. There is occasionally some pink on the snout, but usually only the cream color is apparent. The supralabials are edged with black, especially posteriorly. The under jaw is usually immaculate, except for dark lines between the posterior supralabials.

The ventrum is generally immaculate cream or yellow, except on the edges, which may be reached by the black tips of the main blotches or the secondaries.

A live adult specimen from Tucson, Arizona, was compared with Ridgway's Color Standards, 1912. The main blotches were Black, the dorsal interspaces Coral Red, the lateral interspaces and ventrum Marguerite Yellow. A live juvenile from near Mission Gorge, San Diego County, had alternating Black and Peach Red rings, with almost none of the ground color showing. It was translucent White below. Another juvenile from San Diego was Light Coral Red between the Black saddles.

The statistics of the body blotches, based on 208 specimens from all areas, are as follows: Maximum range 20 to 48, interquartile range 26.7 to 31.7, mean 29.21 ∓ 0.26, coefficient of variation 12.8 per cent. The maximum figure given above is a good example of the distortion which a single specimen can produce in statements of this character, if the range be emphasized; for the specimen with 48 blotches is evidently a freak, the next highest having only 38.

The data on the tail spots are as follows: Extreme range 6 to 16, interquartile range 8.8 to 11.1, mean 9.96 ∓ 0.12, coefficient of variation 16.9 per cent.

Intrasubspecific Trends.—This subspecies has a lower average ventral scale

count along the coast in southern California than further inland, either on the edge of the Colorado Desert or in the Mojave; however, proceeding further eastward into Arizona the average is again reduced until it is lower thtan on the coast. There is a reduction in the number of body blotches and tail spots as we go inland from the coast toward Arizona; this is independent of the specimens of *clarus,* which, if included, would still further reduce the averages. The darkest specimen available is the most southerly from Lower California, that from near Cape Colnett.

Relationships with Other Subspecies.—There are no essential pattern differences between *lecontei* and *tessellatus,* both exhibiting the characteristic *Rhinocheilus* color transpositions. The most important divergence between these forms is in the shape of the snout, which is more pointed and elevated in *tessellatus* than in *lecontei.* In the latter the top of the head is flat or curved downward, the rostral being only slightly raised, if at all, above the nasals and internasals. In *tessellatus,* on the other hand, the snout has a distinct uptilt at the end, and the rostral is raised prominently above the contiguous scales. In *lecontei* the frontal is somewhat blunter than in *tessellatus;* in the latter it is more deeply indented into the suture between the prefrontals. Also, the suture between the internasals is likely to be shorter in *tessellatus* than in *lecontei.* In *tessellatus* the posterior edge of the loreal is somewhat more vertical than in *lecontei.* The upper temporals are usually longer and slimmer in *lecontei* than in *tessellatus. Tessellatus* has a lower average ventral scale count than *lecontei;* this is naturally emphasized in the specimens from the most widely separated regions, namely, coastal southern California and Coahuila. But the rostral remains the character most easily checked. Following the variations in this feature across the southern border of the United States, it would appear that the transition from the pointed snout of *tessellatus* to the blunter nose of *lecontei* occurs in southeastern Arizona and southwestern New Mexico, although additional specimens are required to verify this point.

The relationship between *lecontei* and *clarus,* the newly named desert subspecies, is discussed under the latter form.

Locality Records.—*Lecontei lecontei* has been reported from the following localities:

LOWER CALIFORNIA: 1½ mi. s. of Mexicali, Salt Slough 5 mi. s. of Black Butte (meaning Laguna Salada or near Laguna Salada), 10 mi. e. of Tecate, Tecate, Matanuco, 6 mi. e. of Rosarito Beach, Descanso Point, 12 mi. s. of La Misión, Ensenada, and 5 mi. e. of Cape Colnett. The last named is the most southerly definite locality in Lower California. There is a specimen in the UCLA collection doubtfully recorded from Socorro, and another listed by Lockington (Am. Nat., 1880, p. 295) from "at or to the south of Magdalena Bay". But the same list contains several doubtful allocations, which places this record in question.

CALIFORNIA: *San Diego County*—San Diego (type locality), Stuart, San Luis Rey, Oceanside, La Costa, Leucadia, Olivenhain, Encinitas, Rancho Santa Fe, Torrey Pines, Linda Vista, Seven Points, Murphy Canyon, Camp Elliott,

Rosedale, Rose Canyon, Pacific Beach, Grantville, Morena, Mission Valley, Ocean Beach, Chollas Heights, Point Loma, National City, Bonita, Chula Vista, Coronado Heights, Otay, Nestor, Oneonta, San Ysidro, Fallbrook, Bonsall, Vista, Buena, San Marcos, Escondido, San Pasqual, Bernardo, Hodges Dam, Poway, Miramar, Foster, Lakeside, Flinn Springs, Santee, Mission Gorge, Bostonia, Fletcher Hills, Murray Dam, El Cajon, Grossmont, Hillsdale, Dehesa, La Mesa, Spring Valley, Lemon Grove, Jamacha, Sweetwater Dam, Otay Dam, Otay Mesa, Red Mountain, Rincon, Valley Center, Witch Creek, Ballena, Ramona, Boulder Creek, El Capitan, Descanso, Viejas, Alpine, Deerhorn Flat, Honey Springs, 5 mi. nw. of Oak Grove, near Julian, Banner, San Felipe Valley, and Sentenac Canyon; *Imperial County*—4 and 5 mi. nw. of Calexico, 2 and 3 mi. e. of Holtville, Winterhaven (and 1 mi. w.); *Riverside County*—Aguanga, Elsinore (also 4 mi. n. and 6 mi. ne.), North Elsinore, w. side Lake Elsinore, Moreno, March Field, Box Springs Grade, Pigeon Pass, Hemet, Camp Seeley, Banning, Cabazon, Mecca; *San Bernardino County*—San Bernardino, Alta Loma, Etiwanda, Muscoy, Verdemont, Cajon Station, 5 mi. n. of Phelan, Miller's Corner, Adelanto (also 5, 7, and 11 mi. s., and 6, 8, 10, 12, and 16 mi. n.), Kramer Junction (also 1, 2, 3, 5, 9, 12, 13, and 15 mi. s), Kramer Hills, Kramer, Penshaw, Fremont, 4 mi. s. of Atolia, 3, 8, and 10 mi. n. of Johannesburg, Jimgrey (also 2 mi. w.), Hawes, Eads, Hinkley, Mace, Victorville (also 6 mi. w.), Lone Wolf Colony, Deadman's Point, Lucerne P. O. (also 1 mi. w.), Lucerne Valley, Helendale, Hodge, Lenwood, Barstow (also 18 mi. w., 10 mi. w., and 7 mi. ne.), Nebo, Morongo Inn, 1 mi. e. of Goffs, Mountain Pass, 3 mi. n. of Topock; *Orange County*—Laguna Beach; *Los Angeles County*— Altadena, Pasadena, Claremont, Belvedere, La Cañada Valley, Harold, Vincent (also 2½ mi. ne.), Fairmount, Palmdale, Lancaster, 4 mi. n. of Little Rock, Sierra Pelona Valley, Mint Canyon, Llano, 10 mi. w. of Acton; *Kern County*—Mohave, also 16, 15, 13, 3, and 1 mi. e., and 1 mi. ne.), 5 mi. n. of Muroc Station, 12 mi. w. of Amargo, Rich, Rademacher, 2 mi. e. of Walker Pass Summit, 2 mi. n. of Keene, Tehachapi Mountains, Tejon Ranch, Fort Tejon, Grapevine, Wible, Kimberlena, Ilmon, 20 mi. s. and 8 mi. w. of Bakersfield, 5 mi. e. of Arvin, Rose Station, Elk Hills; *Inyo County*—7 and 12 mi. n., and 1 mi. s. of Olancha, Narka, Bartlett, Cartago (also 4 mi. n.), Searles Lake, 9 mi. s. and 3 mi. se. of Lone Pine, Independence, Owens Valley; *San Luis Obispo County*—Carrizo Plain, Simmler (also 4 mi. e.); *Fresno County*—Coalinga (also 8 mi. w.), Fresno, Laton, Oil Fields; *Tulare County*—White River, Earlimart; *Kings County*—Tulare Lake; *Madera County*—5 mi. s. of Madera; *San Benito County*—Bear Valley; *Mendocino County*—Mt. Sanhedrin; *Lassen County*—5 mi. ne. of Litchfield.

NEVADA: *Clark County*—Sloan, Erie, Boulder City, Hemenway Wash, 4, 12, and 15½ mi. se. of Indian Springs, 3½ and 8 mi. s. of Searchlight; *Lincoln County*—Desert Valley (20 mi. sw. of Pioche at 5400 ft.); *Churchill County*—w. side of Humboldt Salt Marsh (Dixie Valley); *Washoe County*—Derby, Wadsworth; *Elko County*—17 mi. sw. of Wendover (Utah).

UTAH: *Washington County*—Saint George, Castle Cliffs, Bellevue, Veyo; *Millard County*—White Valley, Fillmore; *Juab County*—15 mi. se. of Calleo.

Idaho: *Elmore County*—South Range (Glenns Ferry).

Arizona: *Yuma County*—Yuma (also 3 mi. e. and 4 mi. w.), across the International Boundary from San Luis (Sonora), Love; *Mohave County*—45 mi. se. of Boulder Dam, 2 mi. w. of Chloride, Louise, Topock (also 2 mi. n.); *Yavapai County*—Congress Junction (also 3 mi. s., 7 mi. s., and 2 mi. w.), 4, 5, 9 and 15 mi. n., and 5 mi. nw. of Wickenburg (Maricopa Co.), Date Creek, Fort Whipple; *Maricopa County*—Phoenix, Mesa, Smurr, Desert Wells, near Canyon Lake, Coldwater, 2 mi. n. and 2 and 6 mi. se. of Wickenburg, 3 mi. se. of Wittman, 3 mi. se. of Morristown, 1 mi. w. of Peoria; *Gila County*—Roosevelt-Globe Road; *Graham County*—Camp Grant; *Pinal County*—3 mi. se. of Picacho, Randolph, 10 mi. nw. of Casa Grande, Oracle Junction; *Pima County*—Tucson (also 13 mi. se., 9 mi. s., 10 mi. s., 11 mi. s., 30 mi. s., 5 mi. w.), 1 mi. s. of "A" Mt., 1 mi. s. of Ajo Junction, San Xavier Mission, 1 mi. n. of Sahuarita, Santa Rita Experimental Range, Rillito, Bear Canyon (e. of Sabino Canyon), Rincon Ranch (25 mi. e. of Tucson), Silver Bell Mts., Sonoita; *Santa Cruz County*—Fort Buchanan; *Cochise County*—Benson, Willcox (also 2½ mi. w.) and Fort Huachuca.

Rhinocheilus lecontei tessellatus Garman

Eastern Long-nosed Snake

Plate 12, fig. 2 and Plate 13, fig. 3.

1859. *Rhinocheilus lecontii* Baird, U. S. Mex. Bound. Surv., Vol. 2, p. 21.
1863. *Rhinocheilus Le Contei* Jan, Elenco Sist. Degli Ofidi, p. 43.
1875. *Rhinochilus lecontei* (part) Cope, Bull. U.S.N.M., No. 1, p. 36.
1883. *Rhinochilus leconteii* (part) Yarrow, Bull. U.S.N.M., No. 24, pp. 14 and 88.
1883. *Rhinocheilus lecontei* var. *tessellatus* Garman, Mem. Mus. Comp. Zoöl., Vol. 8, No. 3, p. 74. Type specimen: MCZ 4577. Type locality: Monclova, Coahuila, Mexico.
1884. *Rhinocheilus lecontei* var. *tesselatus* Garman, Bull. Essex Inst., Vol. 16, p. 29.
1887. *Rhinochilus tessellatus* Garman, Bull. Essex Inst., Vol. 19, p. 10.
1929. *Rhinochelus lecontei tessellatus* Barbour and Loveridge, Bull. Mus. Comp. Zoöl., Vol. 69, No. 10, p. 333.

Diagnosis.—A subspecies characterized by a sharply pointed snout, with an upward tilt at the tip caused by the elevation of the rostral above the adjacent scales. This subspecies has more body blotches than *antonii* and *clarus,* and the lateral interspaces are more mottled with black. *Tessellatus* has fewer ventral plates, on the average, than *lecontei lecontei.*

Range.—Central and southern New Mexico, southwestern Kansas, western Oklahoma, Texas west of the 97th parallel, Coahuila and northern Nuevo Leon. Probably intergrades with *lecontei* along the southern border between New Mexico and Arizona.

Material.—This description is based on 79 specimens from the following states: New Mexico 10, Kansas 2, Oklahoma 4, Texas 58, Coahuila 4, Nuevo Leon 1.

Redescription of Type Specimen.—MCZ 4577, Monclova, Coahuila, Mexico. A young female. The dorsal scale rows are 25–23–19. The ventrals are 181; the subcaudals 50 (2d, 33e, 15d); the tail is complete. The anal is undivided. The supralabials are 8–8; infralabials 10–10. The nasals are divided; the loreals 2–1; preoculars 2–2, the upper largest (the division on the left is not quite complete); the postoculars 2–2, about equal. The temporals are 2+3. The prefrontal area is concave; the rostral is tipped up and is raised above the adjacent scales. The point of the rostral nearly separates the internasals. The length over-all is 435 mm. and the tail 68 mm. There are 18 black blotches on the body and 10 on the tail. Dorsally the dark blotches average almost twice the interspaces. Only the three central dorsal rows are unmarked with light, and even a few of the scales in these rows are marked. The primary blotches are single-pointed laterally and are quite sharp, the ends continuing to the edges of the ventrals. The lateral secondary series is uniform; it begins on the eighth row above the ventrals, and continues down to their edges, otherwise the ventrals are clear. Laterally the interspaces between primaries and secondaries are much spotted with brown. The ground color is cream, not white. Some faint pink remains in the interspaces; there was probably considerable red present in life. This specimen differs from the majority of the specimens which I have allocated to this subspecies, particularly as found in Texas, in having fewer and longer blotches, and especially in the low number of ventral scales.

Morphology.—The body is of moderate colubrid proportions, neither especially slim nor stout. The tail is relatively short. The head is little distinct from the neck, with the temporal regions only slightly widened. Viewed from above the head is wedge-shaped, but it is rounded or flat, not pointed, at the rostral. In profile the snout is considerably more pointed, the rostral being rather sharp and greatly advanced beyond the lower jaw, which is short and deeply inset. The rostral is particularly prominent, being raised above the surrounding scales. The prefrontal-internasal line is concave. The eyes are neither large nor protuberant. The diameter of the eye is from 60 to 70 per cent of the distance from the anterior edge of the orbit to the nostril. The pupil is round; the iris in life is red-brown. The tongue is black; the tips are grayish. The longest specimen at hand measures 936 mm.; the next longest 925 mm. Both are males; in fact, there are available six males greater than 900 mm., while the longest female is only 763 mm. However, it is not thought that this represents a fair statement of the difference in size between the sexes, as there are comparatively few females at hand; judging from the other subspecies, I estimate a female length of at least 820 mm. This is undoubtedly the largest of the four subspecies; I have not seen any specimens of the others as large as 900 mm. The smallest Texas juveniles of *tessellatus* were 232 and 240 mm. A specimen from New Mexico, where the subspecies is probably smaller, measured only 186 mm., and two others 213 and 222 mm.

The tail length of the males averages about 14.9 per cent of the length

over-all; the females average 13.6. Most males will fall between 13.5 and 16 6 per cent, and the females between 12.4 and 14.8 per cent. Thus there is some overlapping, and the tail-length ratio cannot be used to segregate the sexes. There is no conclusive evidence that the tail-length ratio changes with age, as it does in some colubrid genera, although there is apparent some tendency of the young adult males to have a slightly higher ratio than in the juveniles and the largest adults. This subspecies continues the tendency evident in *clarus*, in that the tail-length proportion increases as we go eastward from coastal California.

The head length is about 2.6 per cent of the body length over-all.

Scutellation.—The body is covered with smooth and imbricate scales with rounded posterior tips, no ridges being even faintly evident. There is considerable variation in the apical scale pits, which are sometimes present, sometimes not. Where they are discernible the first four lateral rows usually have twin pits, which in the lowest rows are widely separated; the other rows have single pits. Sometimes a row will have both singles and pairs. There are usually 23 scale rows at mid-body, or just a little anterior to mid-body. A few specimens have 22. While 25 scale rows are sometimes present they are rarer than in *lecontei*. On the neck the rows often number 25, even though there be 23 at mid-body; posteriorly they reduce to 19. The reduction from 25 (when present) proceeds in accordance with the following formula: 25-V-23-VI-21-V-19. Occasionally row VI is dropped first.

The data on the ventrals are as follows: Males (46 specimens)—maximum range 191 to 209, interquartile range 197.4 to 202.6, mean 200.00∓0.57, coefficient of variation 1.94 per cent; females (27 specimens)—maximum range 181 to 203, interquartile range 191.9 to 199.1, mean 195.48∓1.03, coefficient of variation 2.75 per cent. The coefficient of sexual divergence is 2.29 per cent.

The anal plate is entire. The subcaudals vary as follows: Males (46 specimens) range from 50 to 61, interquartile range 52.4 to 56.2, mean 54.33∓0.41, coefficient of variation 5.16 per cent. The corresponding figures for the females (26 specimens) are—extreme range 43 to 54, interquartile range 47.4 to 50.8, mean 49.08∓0.50, coefficient of variation 5.18 per cent. The coefficient of sexual divergence is 10.2 per cent. A majority of the subcaudals are usually undivided, a generic characteristic peculiar to this species amongst our southwestern colubrids. However, there are always a number divided; these may vary from two to nearly half the series. Usually the divided scales are concentrated toward the end of the tail and it is rare that the last few scales are undivided. But divided scales, either singly or in groups, may occur almost anywhere in the series. Example series are as follows (e—entire, d—divided, the counts proceeding posteriorly): 2d, 35e, 18d; 1d, 46e, 5d; 1d, 38e, 16d; 2d, 9e, 2d, 27e, 10d; 1d, 52e, 1d. This last specimen has fewer divided caudals than any other specimen of the genus that I have seen.

The rostral is prominent, with the edges usually considerably raised above the surfaces of the adjoining scales. It is slightly wider than high, recurved and deeply indented below; the lower surface slants forward and upward. This subspecies is also exceptional in that the prefrontal area is concave, while in the

others (except occasionally in *antonii*) it is either flat or convex. Posteriorly the rostral is sharply pointed and separates the internasals for about half their depths. The internasals are four sided, with points directed between the rostral and prenasals. The prefrontals curve down on the sides of the head; they are wider than high. The canthus rostralis is quite sharp. The frontal is hexagonal; it is longer than wide. Posteriorly it separates the parietals for a short distance. The supraoculars are relatively small and do not shade the eyes; anteriorly they narrow almost to a point where they contact the prefrontals, thus preventing the meeting of the frontal and preoculars. The parietals are about as wide as long; they are broadly in contact and narrow posteriorly.

The nasals are small and are divided into an anterior and posterior section by a diagonal suture passing through the nostril. The posterior nasal is the larger. The loreal is about twice as long as high, and the lower side is longer than the upper; rarely (2 per cent) there are two loreals. There is usually a single preocular which is higher than wide; 3 per cent of the specimens have two preoculars. There are two postoculars (1 per cent have 3) the upper being slightly the larger. The temporals usually number 2+3 but various other formulas are met, including 1+2, 1+3, 2+2, 2+4, 3+3, and 3+4. The upper temporal usually contacts both postoculars; both temporals slope upward posteriorly.

The supralabials vary from 7 to 9, with the following percentage distribution in the specimens examined: 7(3), 8(92), 9(5). The next to the last is the largest. The fourth and fifth supralabials are in contact with the eye. The infralabials may number from 8 to 11, with 9 predominating; eleven per cent of the specimens have 8 and a similar proportion have 10. Eleven infralabials are quite rare in this subspecies. The first infralabials contact on the mid-ventral line, the first three (rarely four) contact the pregenials; the fifth is much the largest.

The mental is small and triangular. The pregenials are larger than the posterior. The latter are usually divided longitudinally so that they are not to be distinguished from the gulars. There are generally 4 or 5 scales (end to end) between the pregenials and the first ventral, and 7 rows between the first ventral and the infralabials.

Pattern and Color.—In *tessellatus* the pattern consists of about 25 black or dark-brown saddles on a cream or yellowish background. However, the saddles are only unicolor mid-dorsally, since down the sides the dark scales are increasingly marked with light centers, while the light scales of the interspaces are increasingly marked with dark spots. Laterally this color inversion is often so complete, especially in adults, that the major blotch pattern is obliterated. The dorsal interspaces and, to a lesser extent, the sides are colored with pink or red, but this color is often absent in preserved specimens; especially it has a tendency to disappear in the juveniles. Dorsally the dark blotches generally have a longitudinal extent about 1½ times that of the interspaces, but this proportion may vary from as low as 1 to 1, to as high as 2½ to 1.

Laterally the dark blotches narrow and the interspaces widen, but the latter become so mottled, either with dark spots on the individual scales, or by a series

of dark secondaries that the widening is not particularly apparent. The main saddles and the secondaries usually narrow to points touching the outer edges of the ventrals, which otherwise are generally immaculate.

The lateral pattern in the juveniles is usually simpler than in adults, since the main saddles and the secondaries are quite clear and fairly regular, without the indiscriminate mottling which tends to obscure the lateral pattern of the adults. The alternating dark and light pattern is carried to the tip of the tail.

Posteriorly the scales on the top of the head may be all dark or mottled with the light ground color. Anteriorly only the edges of the rostral, internasals, and prefrontals are dark. In live specimens the snout is often pink or red. The supralabials are edged with dark, especially posteriorly. The posterior infralabials may be edged with dark, otherwise the lower jaw is immaculate. The dark of the parietal region usually extends three or four scales behind the parietals, where the first light cross ring begins.

A live specimen from Wilson County, Texas, was checked by Ridgway's Color Standards (1912). The blotches were Black, the dorsal spaces between Brazil Red, and the lower lateral areas and ventrum Massicott Yellow.

The numerical statistics of the pattern of *tessellatus* based on 75 specimens are as follows: Range of body blotches 18 to 35, interquartile range 23.0 to 28.4, mean 25.72 ∓ 0.46, coefficient of variation 15.4 per cent; tail spots—extreme range 6 to 17, interquartile range 8.4 to 11.4, mean 9.90 ∓ 0.26, coefficient of variation 22.6 per cent.

Intrasubspecific Trends.—The ventral scale counts in this form are highest in central and southern Texas, and lowest in Coahuila and New Mexico. There is also a downward tendency in Oklahoma and Kansas. Specimens from southern Texas have the rostral most prominently enlarged; as might be expected this character is less noticeable in the western specimens, as the territory of *lecontei* is approached. Specimens from Oklahoma and Kansas tend to have more blotches than those from Texas.

As is characteristic of the genus, the pattern in this subspecies is quite variable with respect to the color and shape of the blotches, and the nature of the spotting. Not enough specimens are available from the periphery of the range to determine the pattern trends with accuracy. Probably all of the individuals of this subspecies are brightly marked with red in life, but this cannot be verified from preserved material. Some of the specimens from southern Texas are particularly handsome in life, with clear-cut bright-red rings between the black, and with red snouts.

Relationships with Other Subspecies.—In pattern, *tessellatus* is much like *lecontei*, usually with a high number of dorsal blotches, red in the interspaces, and with much lateral spotting. The essential difference between the two is the shape of the snout. In *tessellatus* the rostral has a sharper and more protruding point, with an upward tilt at the tip, and the edges of the rostral are raised above those of the abutting scales. Evidently *tessellatus* and *lecontei* intergrade in southeastern Arizona, there being a gradual change in the character of the rostral

along the southern border of the United States. Lack of adequate material prevents an exact knowledge of the area of intergradation. *Tessellatus* and *antonii* may intergrade across the tableland of Durango or southern Chihuahua; this is indicated by a pattern tendency toward *antonii* shown by certain specimens from Coahuila. Also, *antonii* has a somewhat more prominent and pointed rostral than either *lecontei* or *clarus*, thus indicating an affinity toward *tessellatus*. But as yet there are no specimens available from the intervening tableland, so that this relationship is not certain.

Tessellatus has a somewhat lower average ventral scale count than *lecontei* but the difference, while significant, is not great enough to serve as a key character. Peculiarly, the type specimen of *tessellatus* has the lowest ventral count of any specimen of the genus yet available. There are minor differences in head scales between *tessellatus* and *lecontei*, as mentioned under the latter form, in addition to the important difference in the rostral.

Locality Records.—Tessellatus has been reported from the following localities:

NUEVO LEON: 40 mi. s. of Laredo.

COAHUILA: Monclova (type locality), Jaral, Parras.

TEXAS: *Cameron County* — Brownsville; *Hidalgo County* — Edinburg, McCook, McAllen; *Starr County*—Rio Grande City, 5 mi. sw. of Ramirito; *Kleberg County*—Kingsville; *Duval County*—San Diego; *Webb County*—Laredo (also 12 mi. n. and 5 mi. e.); *La Salle County*—5 mi. n. of Encinal; *Atascosa County*—Lytle (also 7 mi. s.), 10 mi. ne. of Pleasanton; *Wilson County*—10 mi. w. of Floresville; *Bexar County*—San Antonio (also 6 mi. s.), Somerset (also 3 mi. n., 7 mi. sw., 3 mi. sw.), Helotes; *Comal County; Travis County*—Austin; *Williamson County*—Georgetown; *Burnet County*—Burnet, Clear Creek; *McLennan County*—China Spring, Rock Creek (Rock Spring), half way between China Spring and Waco, Waco (also 9 mi. n.), Hewitt, 1½ mi. n. of Robinson, Turney Trading Post; *Bosque County*—Clifton; *Tarrant County*—Near Fort Worth; *Palo Pinto County*—Palo Pinto, Mineral Wells, mouth of Ramsey Creek (Brazos River); *Wilbarger County*—Vernon; *Eastland County*—Desdemona; *Menard County; Edwards County*—Rocksprings; *Val Verde County*—Highway 90 near Terrell County line; *Tom Green County*—San Angelo, Christoval; *Coke County*—Fort Chadbourne; *Midland County*—Midland; *Brewster County*—Glenn Spring, Persimmon Gap, Chisos Mts.; *Presidio County*—Marfa; *Jeff Davis County*—Fort Davis; *Reeves County*—Pecos; *Hudspeth County*—42½ mi. e. of El Paso; *El Paso County*—El Paso, Fort Bliss.

OKLAHOMA: *Comanche County; Harmon County*—9 mi. sw. of Hollis; *Alfalfa County; Woods County*—12 mi. w. of Alva; *Harper County.*

KANSAS: *Barber County; Clark County; Meade County*—9 mi. se. of Meade; *Morton County*—3 mi. n. of Elkhart; *Finney County*—Garden City.

NEW MEXICO: *Quay County*—3 mi. w. of Tucumcari; *Eddy County*—

8 mi. nw. and 1 mi. n. of Carlsbad; *Otero County*—3 mi. s. of Almagordo; *Dona Ana County*—Mesilla Park, Mesilla Valley (near Las Cruces); *Hidalgo County*—east of Lordsville; *Bernalillo County*—Albuquerque; *Valencia County*—20 mi. e. of Belen.

Rhinocheilus lecontei clarus subsp. nov.

Desert Long-nosed Snake

Plate 13, figs. 1 and 2.

1897. *Rhinocheilus lecontei* (part) Van Denburgh, Occ. Papers Calif. Acad. Sci., No. 5, p. 174.

Type.—No. 31,440 in the collection of LMK, collected in the Borego Valley, 2 miles north of The Narrows, San Diego County, California, at 7:57 P. M., May 7, 1939, by Richard Neil. Forty-two paratypes are available from various points in the Borego and San Felipe valleys in San Diego County, and in the Coachella Valley of Riverside County, California.*

Diagnosis.—A subspecies distinguished from *lecontei* and *tessellatus* by having fewer and longer dorsal blotches, and with the lateral spaces between the primary blotches either immaculate or with few spots, while the other two are much spotted. It also differs from *tessellatus* in not having an up-tilted snout. It has relatively shorter blotches and wider interspaces than *antonii*, and there are other pattern differences.

Description of the Type.—Adult male. Length over-all (before setting in preservative) 834 mm.; length of tail 113 mm. The tail is not quite complete, but only 1 mm. or so is missing. The scale rows are 23–23–17; all scales are smooth. The ventrals number 209, and the subcaudals 53 (2d, 34e, 17d). The anal is entire. The scales on the top of the head comprise a recurved rostral, a pair of small internasals, a pair of larger prefrontals, a large hexagonal frontal, small supraoculars, and a pair of parietals. The nasals are divided. The loreals

* These paratypes comprise the following specimens from San Diego County: LMK 2631 Yaqui Well, SDSNH 11288 Yaqui Well, SDSNH 11349 LaPuerta, SDSNH 16998 San Felipe Valley, SDSNH 17009 1 mi. e. of The Narrows, LMK 23442 Benson's Dry Lake, LMK 25632 The Narrows, LMK 26815 Yaqui Well, LMK 26816 San Felipe Valley, LMK 26849-50 The Narrows, LMK 28650 Yaqui Well, LMK 28755 The Narrows, LMK 29078 Borego Valley, LMK 29110 Sentenac Bridge, LMK 29514 1 mi. w. of Sentenac Canyon, LMK 31445 6 mi. w. of The Narrows, LMK 31491 Yaqui Well, LMK 32993 Borego Valley, LMK 33021 Scissors Crossing, LMK 33022 1.4 mi. w. of The Narrows, LMK 33049 Scissors Crossing, LMK 33060 1.5 mi. e. of Scissors Crossing, LMK 33398 Sentenac Canyon, UCLA 451 San Felipe Ranch, UCLA 509 San Felipe Ranch, UCLA (no number) Sentenac Canyon, S. D. State College (no number) (3) Borego Valley, FMNH 26783 Dry Lake, FMNH 26784 Ranchita. The following are from or near the Coachella Valley in Riverside County: LMK 28670 Cathedral City, LMK 31503 Indio, LMK 32137 Palm Springs R. R. Station, AMNH 60511 2 mi. n. of Indian Wells, AMNH 60522 6 mi. n. of Indian Wells, AMNH 60091 10 mi. s. of Indio, AMNH 60533 Garnet, UCLA 508 Mouth of San Andreas Canyon near Palm Springs, UCLA 709 between the foot of the Palms-to-Pines Highway and Indio, MVZ 228 Dos Palmas Spring.

are 1–1, preoculars 1–1, and postoculars 2–2. The temporals are 1+3, 2+3, The supralabials number 8–8 and the infralabials 9–9.

The pattern comprises a series (23 on the body, 7 on the tail) of black saddles on a white background. The saddles occupy from 2 to 2½ times the longitudinal extent of the interspaces. The saddles narrow as they approach the ventrum. A circular patch in the side of each black saddle has white-centered scales. The ventrum is immaculate white, except that anteriorly the bottoms of the saddles touch the outer edges of the ventrals.

Summary of Paratypes.—There are available from the Borego-San Felipe area of San Diego County 32 specimens of this subspecies, and from the Coachella area in Riverside County 10 additional. As I consider the snakes of these two areas to be the most typical representatives of the subspecies *clarus*, their statistics are presented separately from the more generalized description of *clarus* which is set forth later, in a manner conforming to the descriptive material of the other three subspecies. It is for this reason that the data on the type and paratypes are only briefed.

The scale rows at mid-body are 23 in all cases. The ventrals are as follows: Males (30 specimens)—extreme range 202–218, interquartile range 208.9–213.9, mean 211.43∓0.67, coefficient of variation 1.74 per cent; females (11 specimens)—extreme range 201–213, interquartile range 205.2–210.3, mean 207.73∓1.14, coefficient of variation 1.82 per cent. Caudals, males (27 specimens)—extreme range 50–58, interquartile range 52.4–54.8, mean 53.56∓0.34, coefficient of variation 3.33 per cent; females (10 specimens)—extreme range 43–49, interquartile range 44.3–46.5, mean 45.40∓0.52, coefficient of variation 3.63 per cent. The supralabials are distributed as follows: 7(2), 8(76), 9(4), and the infralabials 8(5), 9(60), 10(20). There are two loreals in one specimen out of 42; the rest have one. There are also 2 preoculars in one specimen, whereas all others have one. Two postoculars are the rule, but one specimen has 3 on one side. The distribution of the body blotches (42 specimens) is as follows: Extreme range 17–27, interquartile range 20.8–23.3, mean 22.05∓0.29, coefficient of variation 8.68 per cent. The tail spots (38 specimens) are—extreme range 6–11, interquartile range 7.1–8.8, mean 7.97∓0.20, coefficient of variation 15.56 per cent.

The more complete survey of this subspecies follows:

Range.—The Borego and Coachella valleys in southern California, with scattered occurrences elsewhere in the Colorado, Mohave, and Yuma deserts of southern California, extreme southern Nevada, and western Arizona.

Material.—I have had available for this study 63 specimens from California, 1 from Nevada, and 14 from Arizona.

Morphology.—The body is of normal colubrid proportions, neither racer- nor boa-like; however, the tail is rather short. The head is slightly distinct from the neck, the temporal regions being only a little widened. Viewed from above the head is wedge-shaped, but has a rounded, rather than pointed, rostral. In profile the snout is more pointed, the rostral being rather sharp, with the lower

jaw short and deeply inset; thus there is an upward and forward slant to the underside of the rostral. The eyes are neither large nor protuberant. The diameter of the eye is about 70 per cent of the distance from the anterior edge of the orbit to the nostril. The pupil is round; the iris in life is brown or red-brown. The tongue is black with light tips; it is red-brown at the base. The longest specimen at hand measures 880 mm.; the longest specimens are males, for 5 males of this subspecies exceeding 800 mm. are available, while the longest female is 783 mm. Young specimens just hatched measure about 250 mm.; the smallest available is 245 mm.; other small specimens are 246, 252, and 253 mm.

The tail length of the males averages about 14.6 per cent of the length over-all; the females average 13.2. Most males will fall between 13.8 and 15.4 per cent, and the females between 12.3 and 13.9 per cent. Thus there is some overlapping, and the tail-length ratio cannot be used to segregate the sexes with certainty. No ontogenetical change in the tail length ratio is evident. This subspecies has a slightly longer tail than *lecontei*.

The adult head length is about 2.8 per cent of the body length over-all.

Scutellation.—The body is covered with smooth and imbricate scales with rounded posterior tips. Apical scale pits are sometimes present; when evident the two lower lateral rows have two pits per scale, while on the other rows the pits are single. There are usually 23 scale rows at mid-body; rarely there are 22 or 24. On the neck the rows usually number 25; posteriorly they reduce to 19. The reduction from 25 proceeds in accordance with the following formula 25-VI-23-V-21-V-19. Occasionally the fifth row is dropped first, and the sixth second.

The data on the ventrals are as follows: Males (48 specimens)—maximum range 195 to 218, interquartile range 205.6 to 212.8, mean 209.17 ∓ 0.77, coefficient of variation 2.56 per cent; females (26 specimens)—maximum range 198 to 213, interquartile range 202.5 to 208.1, mean 205.31 ∓ 0.82, coefficient of variation 2.04 per cent. The coefficient of sexual divergence is 1.86 per cent.

The anal plate is entire. The subcaudals vary as follows: Males (41 specimens) range from 50 to 58, interquartile range 51.8 to 54.4, mean 53.07 ∓ 0.30, coefficient of variation 3.61 per cent. The corresponding figures for the females (28 specimens) are—extreme range 42 to 49, interquartile range 44.6 to 47.5, mean 46.07 ∓ 0.40, coefficient of variation 4.65 per cent. The coefficient of sexual divergence is 14.1 per cent. The majority of the subcaudals are usually undivided, a characteristic peculiar to this genus amongst colubrids in the United States. However, there are always a number divided; these may vary from two to as many as half the series. Usually the divided scales are concentrated toward the end of the tail and it is rare indeed that the last few scales are undivided. However, divided scales, either singly or in groups, may be scattered almost anywhere in the series. Example males are 1d, 29e, 1d, 5e, 1d, 1e, 17d; 42e, 1d, 1e, 9d; 1d, 42e, 1d, 4e, 3d, (d signifies divided, e entire; the figures are from the vent to the tail tip).

The rostral is prominent, sometimes with its edges slightly raised above

those of the adjacent scales. It is slightly wider than high, recurved and deeply hollowed out below. Posteriorly it is sharply pointed, protruding between the internasals and separating them for somewhat less than half their depths. The internasals are triangular, with the points directed between the rostral and prenasals. The prefrontals curve downward on the sides of the head; they are wider than high. The frontal is hexagonal; it is longer than wide, and is widest anteriorly. Posteriorly it separates the parietals for a short distance. The parietals are slightly longer than wide; they are broadly in contact. The supraoculars are relatively small; they do not jut over the eyes; anteriorly they narrow to a point where they contact the prefrontals, thus preventing contact between the frontal and preoculars.

The nasals are small and are divided into an anterior and posterior by a diagonal suture passing through the nostril. The posterior nasal is the larger. The single loreal is about twice as long as high; rarely (about 1 per cent) there are two loreals. There is usually a single preocular which is higher than wide. Three per cent of the specimens have two preoculars. There are two postoculars (rarely 1 or 3) the upper being slightly the larger. The temporals are usually 2+3 but there may be 1+2, 1+3, or 2+4. The anterior temporals are often long and narrow; the upper generally contacts both postoculars.

The supralabials vary from 7 to 9, with the following percentage distribution in the specimens included in this series 7(2), 8(94), 9(4). The seventh is usually the largest and the fourth and fifth are in contact with the eye. The infralabials number from 8 to 10, with 9 predominating; 10 per cent of the specimens have 8 and 18 per cent have 10. The first two contact on the mid-ventral line; the first 3 usually contact the pregenials but sometimes 4 are in contact; the fifth is the largest.

The mental is small and triangular. The pregenials are much larger than the posterior. The latter are usually divided so that they are not distinguished from the gulars. There are 5 or 6 scales (end to end) between the pregenials and the first ventral, and 5 or 6 rows between the first ventral and the last infralabial.

Pattern and Color.—Clarus, in its most typical form, is essentially a black and white snake, the color contrast being as sharp as is to be found in any southwestern snake. The pattern consists of a series of 16 to 27 black saddles separated by white cross rings, the light rings being about one-half the extent (longitudinally) of the dark. The black saddles narrow as they approach the ventrals and, at the same time, the scales comprising them have an increasing amount of light in the scale centers. These light-centered scales are usually concentrated in the middle of each lateral wing of the black saddles. The black saddles generally terminate at or near the scale row next to the ventrals. The lower edges of the saddle may terminate either in a straight line or there may be a short pointed extension to the ventrals themselves. In some cases there may be two such points per saddle, an anterior and posterior. The lateral light areas between the saddles are usually immaculate, but may be speckled, especially in *lecontei* intergrades. Occasionally dark lateral spots occur between blotches at the edges of the ventrals. A few specimens have the light rings clouded with

red, either dorsally, laterally, or both. However, the most characteristic feature of *clarus*, as compared to *lecontei*, is not only the greater extent of the dorsal saddles, but likewise the immaculate condition of the light lateral interspaces.

Below, the color is usually immaculate white or cream, but there may be a few dark markings on the ventrals, especially toward the outer edges, which may be reached by the lateral points of either the primary saddles or the intermediate secondary spots if present.

The top of the head is black in the parietal region, but is increasingly mottled with light toward the snout. Usually the rostral, internasals, and prefrontals are dark only at the sutures. The supralabials are separated by dark lines. The under jaw is usually immaculate, although occasionally the sutures between the infralabials are dark.

Several specimens of *clarus* were checked by Ridgway's Color Standards, 1912. The most typical specimens are entirely Black and White. Some with *lecontei* tendencies have suffusions of Light Coral Red between the main blotches, and are Massicott Yellow below.

The numerical statistics of the *clarus* pattern are as follows: Body blotches (76 specimens)—extreme range 16 to 27, interquartile range 20.0 to 23.0, mean 21.51∓0.26, coefficient of variation 10.5 per cent. Tail spots (68 specimens with complete tails)—extreme range 5 to 11, interquartile range 6.7 to 8.4, mean 7.53∓0.16, coefficient of variation 17.1 per cent.

It will be observed that there is some overlap in body blotches between *lecontei lecontei* (20–48) and *clarus* (16–27). I might have differentiated the two entirely on an arbitrary limit of body blotches, assigning to *clarus* all snakes having 24 or fewer blotches, and to *lecontei* those having 25 or more. This would involve a transfer of 9 per cent of the specimens now considered *clarus* to *lecontei*, and a transfer in the reverse direction of 8 per cent of the specimens now considered *lecontei*. But I have preferred to make a segregation based on a summation of pattern differences, thus including not only the number of blotches, but their color and shape, the relative width of the interspaces, and the character of the mottling (or its absence) in the lateral areas. In segregating on these bases some specimens having as few as 20 blotches are allocated to *lecontei* and some with as many as 27 are placed in the *clarus* category. But even with this method the blotch differences are highly significant. We have the following statistics:

	Mean of lecontei	*Mean of clarus*	*Significance of Difference, P*	*Coefficient of Divergence, Per Cent*
Body blotches	29.21∓0.26	21.51∓0.26	.000001—	30.4
Tail spots	9.96∓0.12	7.53∓0.16	.000001—	27.8

Intraspecific Trends.—As *clarus* comprises a desert intrusion into the territory of *lecontei lecontei* it is to be expected that on the periphery of its range it should trend toward the adjacent specimens of *lecontei*. The ventrals average lower in Arizona than in the Colorado Desert of California. The body blotches and tail spots reach a minimum in Arizona, thus showing the effect of contact with *antonii* rather than with *lecontei*. But the pattern is purest in the specimens

from the Borego and Coachella valleys, as far as can be verified by material now at hand.

Relationships with Other Subspecies.—Although *clarus* is a well differentiated subspecies, with respect to pattern and other characters, it is geographically the least consistent and satisfactory. This is particularly true of its relationship with *lecontei*. The relationship with *antonii*, which is discussed under that form, is more consistent, at least as far as available specimens indicate, northern Sonora being apparently an area of intergradation. While body blotches alone will not segregate every specimen accurately between *clarus* and *antonii*, a proper allocation can be made by considering the relative sizes of the blotches and interspaces, the character of the blotches, and the spotting of the ventrum.

There is a considerable area inhabited by *lecontei*, most of its territory in fact, in which no specimens akin to *clarus* occur, the vicinity of San Diego (the type locality) and coastal southern California being examples. But there is no territory in which *clarus* predominates in which an occasional *lecontei* intergrade does not intrude, although rarely. And there are other areas where the population is predominantly *lecontei*, (the western Mohave Desert for example) where an occasional *clarus* is found. This is also true of the Wickenburg-Tucson area. But in eastern San Diego County, including somewhat surprisingly, the mountain area between Deerhorn Flat and Jacumba, all specimens are pure *clarus*, although it should not be presumed that any single character will correctly segregate every specimen. The differences may be summarized as follows:

Lecontei	*Clarus*
Ventral scales average M 206.3, F 201.3	Ventral scales average M 209.2, F 205.3
Ground color cream	Ground color white
Dorsal blotches (body and tail) usually exceed 30; or body blotches alone usually exceed 24	Dorsal blotches 30 or less; or body blotches alone usually number 24 or less
Blotches usually less than twice interspaces	Blotches usually 2 or more times the interspaces
Red in interspaces between the black blotches*	No red, or only a pink suffusion, between the black blotches
Black blotches pointed laterally with a single point	Black blotches with a straight edge laterally, or with two points, especially anteriorly
Lateral interspaces heavily speckled or spotted with black (adults only)	Lateral interspaces clear or faintly spotted with an occasional black scale tip
Secondary blotches at lower edge of interspaces present and conspicuous	Secondary blotches at lower section of interspaces absent or small, particularly anteriorly

If we take the summation of these characters we find a considerable area (eastern San Diego County and central Riverside County) where the population

* The red will often disappear in preservation, especially in juveniles. This characteristic is therefore useless in judging young specimens.

is pure *clarus*, intergrading with *lecontei* both to the west and east. This is no doubt the result of an intrusion from the south, somewhat like that noted in *Sonora occipitalis*. The population of the western Mohave is primarily *lecontei*, with an occasional *clarus*. A single *clarus* has been found amongst a large number of *lecontei* in the San Joaquin Valley. In the desert regions of southwestern Arizona there are not enough specimens to determine the areas inhabited by the two forms. *Clarus* probably predominates from Wickenburg west and south, except that *lecontei* occurs in the Yuma oasis.

Locality Records.—*Clarus* has been collected or identified at the following places:

California: *San Diego County*—2 mi. n. of The Narrows in Borego Valley (type locality), Borego Springs, Horse Canyon (w. end Collins Valley), San Felipe Valley, Scissors Crossing, Sentenac Canyon, Yaqui Well, foot of Yaqui Pass, The Narrows, Benson's Dry Lake (Ocotillo), county line e. of Benson's (specimens have been taken at less than 1 mile intervals along the road all the way from the last named point west to Sentenac Canyon), San Felipe Wash, La Puerta, Vallecito, Ranchita, Mountain Spring Grade, 5 mi. w. and 7 mi. e. of Jacumba, Boulevard, Hipass, La Posta, Deerhorn Flat, and Dulzura. The last three localities are west of the mountain crest. (*Lecontei* intergrades have been collected at the following points in the cismontane area: 2 mi. nw. of Fallbrook, Valley Center, El Capitan, Dehesa, Deerhorn Flat, and Campo; and at these transmontane points: San Felipe, Yaqui Well, near Dry Lake, Vallecito). *Imperial County*—Mountain Spring, Myer's Creek Bridge (also 2 mi. w. and 1 mi. e.); *Riverside County*—Whitewater, Palm Springs R. R. Station, 5 mi. nw. of Palm Springs, mouth of San Andreas Canyon near Palm Springs, mouth of Palm Canyon 2 mi. s. of Palm Springs, Dos Palmas Spring at 3500 feet, Palms to Pines Highway at 3000 feet (*lecontei* intergrade), Garnet, Cathedral City, Indian Wells (also 2 mi. n. and 6 mi. n.), Indio (also 10 mi. s.), Oasis, 5 mi. s. of Vidal (San Bernardino County), Blythe; *San Bernardino County*—Morongo Valley, 3 mi. ne. of Morongo Lodge, Adelanto (also 5 mi. n.), 13 mi. n. of Red Mountain (*lecontei* intergrade), Eads (intergrade), Barstow (also 5 mi. s.), one-half way between Barstow and Baker, Yermo, Daggett, Gale, 5 mi. se. of Cima (Providence Mts.), 8 mi. w. of Victorville; *Kern County*—13 mi. e. of Mojave; *Tulare County*—Unspecified locality; *Inyo County*—Inyokern.

Nevada: *Clark County*—3 mi. s. of Bunkerville.

Arizona: *Yuma County*—Quartzsite (also 7 mi. e.); *Yavapai County*—Camp Verde, 3 mi. s. of Congress Junction; *Maricopa County*—near Mesa, 2 mi. s. of Wickenburg, Tempe; *Gila County* (?)—Pinal Mts.; *Pinal County*—7 mi. s., and 15 mi. se. of Florence, 3 mi. w. of Thompson; *Pima County*—Tucson (?); *Cochise County*—indefinite locality; *Santa Cruz County*—Nogales (*antonii* intergrade).

Rhinocheilus lecontei antonii Dugès

Mexican Long-nosed Snake

1886. *Rhinocheilus Antonii* Dugès, Proc. Am. Philos. Soc., Vol. 23, p. 290.

Type specimen: In Museo Alfredo Dugès, Guanajuato, Mexico. Type locality: San Blas near Mazatlán, Sinaloa, Mexico; this probably refers to San Blas, Nayarit.

1894. *Rhinochilus antonii* Boulenger, Cat. Snakes Brit. Mus., Vol. 2, p. 213.

Diagnosis.—A subspecies characterized by very wide dorsal dark blotches (along the body) and comparatively narrow interspaces. The number of blotches is the lowest of the four subspecies and is markedly lower than in *lecontei* and *tessellatus*. Although some specimens of *clarus* have almost as few spots as *antonii*, the blotches of the former are shortened and the interspaces comparatively wider than in *antonii*. There are other pattern differences. *Antonii* averages fewer ventral plates than *clarus*.

Range.—The Mexican states of Sonora, Sinaloa, Nayarit, and Jalisco. Probably intergrades with *clarus* along the Sonora-Arizona border.

Material.—I have examined 3 specimens from Sonora, 10 from Sinaloa, and 1 from Jalisco; total 14. Data on the type specimen have been available through the courtesy of Dr. Hobart M. Smith.

Redescription of Type Specimen.—I have not seen this specimen; the data hereunder are taken from a description and photographs kindly furnished by Dr. Smith, who studied Dugès' material in the Guanajuato collection. Dr. Smith believes the type locality to be San Blas, Nayarit, Mexico.

A juvenile female. The dorsal scale rows are 23-23-19, with two apical pits. The ventrals number 196; the anal is entire; the subcaudals are 42 (1d, 37e, 3d, 1e). The supralabials are 8-8, infralabials 9-9. The nasals are divided, the loreals single, one preocular, two postoculars, and temporals 2+3. The prefrontal area is concave with the rostral somewhat raised. The length over-all is 295 mm., length of tail 35 mm. There are 15 dorsal blotches on the body and 4 on the tail. The blotches are reddish brown; they are about 5 times the interspaces in longitudinal extent. The dark bands are laterally marked with light centers. The ventral surface is heavily mottled with red brown.

Morphology.—The body of this subspecies is of average colubrid proportions, neither slim nor stout. The tail is rather short. The head is little distinct from the neck, with the temporal regions but slightly enlarged. Viewed from above the head is wedge-shaped, but it is rounded or square, not pointed, at the rostral. Viewed from the side the snout is more pointed, the rostral being rather sharp, slanting upward and forward, with the lower jaw short and deeply inset. The snout seems less pointed than in the other subspecies. The eyes are neither large nor protuberant. The diameter of the eye is about 65 to 80 per cent of the distance from the front of the orbit to the nostril. The pupil is round or slightly elliptical. There are too few specimens of this subspecies available to permit conclusions with respect to the size to which it grows. The longest specimen at hand measures 780 mm.; this is a female from Sonora. The longest Sinaloa specimen measures 687 mm. The smallest individual is 278 mm. It is probable that this subspecies is approximately the same as *clarus* in size.

The tail length of the males averages about 14.4 per cent of the length

over-all; the females 13.3.

The head length in adults is about 2.9 per cent of the body length over-all.

Scutellation.—The body is covered with smooth and imbricate scales with rounded posterior tips. The apical scale pits are usually imperceptible; where present they are quite variable, being both single and double. The latter predominate even on the dorsal rows, thus differing from the other subspecies. There are usually 23 scale rows at mid-body, but one from the northern part of the range in Sonora has 25. On the neck the rows sometimes number two more than at mid-body. Posteriorly there are 19. While it is believed that the normal formula for dropping scale rows is 25-V-23-VI-21-V-19, the first row dropped may be the sixth, followed by the fifth or seventh, and finally the fourth.

The data on the ventrals are as follows: Males (5 specimens)—maximum range 195 to 203, interquartile range 197.4 to 201.9, mean 199.6∓1.44, coefficient of variation 1.61 per cent; females (10 specimens)—maximum range 193 to 204, interquartile range 195.3 to 200.3, mean 197.8∓1.15, coefficient of variation 1.84 per cent. The anal plate is entire.

The subcaudals vary as follows: Males (5 specimens) range from 48 to 54, interquartile range 49.2 to 52.4, mean 50.80∓1.07, coefficient of variation 4.70 per cent. The corresponding figures for the females (8 specimens) are—extreme range 42 to 50, interquartile range 43.9 to 46.8, mean 45.33∓0.73, coefficient of variation 4.81 per cent. The majority of the subcaudals are undivided, a generic characteristic unique amongst our northern colubrids; however, there are always some divided. These may vary from one-fifth to as many as half the series, and are generally concentrated toward the end of the tail.

The rostral is prominent, sometimes with the edges raised slightly above the contiguous scales, so that in some specimens the prefrontal area is concave, thus resembling *tessellatus*. The rostal is about as high as wide, recurved and deeply indented below; posteriorly it is rather sharply pointed and separates the internasals for about half their depths. The internasals are quadrangular with points directed between the rostral and prenasals. The prefrontals, which are considerably larger than the internasals, curve down on the sides of the head; they are much wider than high. The frontal is hexagonal; it is longer than wide, and is somewhat less wedge-shaped than in the other subspecies. Posteriorly it separates the parietals for a short distance. The supraoculars are quite small and do not shade the eyes; anteriorly they narrow almost to a point; they touch the prefrontals, thus preventing contact between the frontal and preoculars. The parietals are broadly in contact and narrow posteriorly . They are the same size as the frontal, or slightly smaller.

The nasals are small and are divided by a diagonal suture through the nostril into a smaller prenasal and a larger postnasal. The loreal is longer than high, and is pointed anteriorly. There is usually a single preocular which is higher than wide. One specimen out of fifteen has two preoculars on one side. There are two postoculars, the upper being slightly the larger. The temporals usually number 2+3 but may be 1+3 or 2+4. The upper temporal is slightly narrower than the lower.

The supralabials usually number 8, but one specimen out of fifteen has 9. The next to the last is the largest; the fourth and fifth touch the eye. The infralabials number 9 on each side, but one specimen has 10 on one side. The first pair contact on the mid-ventral line, the first 3 or 4 contact the pregenials; the fifth is the largest.

The mental is small and triangular. The pregenials are much larger than the posterior, which are slim, and sometimes truncated. There are usually 5 scales (end to end) between the pregenials and the first ventral, and 6 scale rows between the first ventral and the infralabials.

Pattern and Color.—The body pattern consists of a series of about 17 wide, dark-brown or black rings separated by narrow white or cream rings which have approximately one-quarter the width of the dark. Along the mid-dorsal line both rings and interspaces are unicolor, this being usually true of the central seven to nine dorsal scale rows. Laterally the scales of the dark rings have white centers; these light spots increase in expanse as the ventrum is approached, so the lower sides are mottled. Similarly the light interspaces often have dark spots in the scale centers on the lower sides. Sometimes the white rings widen toward the ventrum, but in other specimens the light rings are constant in width, or more or less narrow laterally. The tail is similarly marked with wide dark and narrow light rings.

Below, the ventrum is much marked with irregular dark blotches, some of which are on the edges of the ventrals, others in the center.

The top of the head is dark brown, fading somewhat toward the snout. The sides of the head are mottled with the ground color. The edges of the labials are dark, the centers light. On the under-side of the head there are usually some dark marks, especially on the edges of the gulars. Some specimens from Sonora tend toward *clarus* in that the interspaces are wider and are clouded with red; also, the snout, instead of being washed with brown, is mottled. In these specimens the lower surfaces are less marked with dark and the blotches adhere more to the outer edges of the ventrals.

A single juvenile shows less lateral mottling than is evident in the adults, a condition similar to that observed in the other subspecies.

Numerically the body blotches of the available specimens of *antonii* are distributed as follows: 14(3), 15(1), 16(4), 17(3), 19(1), 20(2), 23(1); mean 16.95 ∓ 0.51. The tail spots are 3(1), 4(4), 5(4), 6(2), 7(3); mean 5.14 ∓ 0.33.

Intrasubspecific Trends.—There are hardly enough specimens of this subspecies at hand to permit the determination of trends or variations. It is, however, evident, as might be expected, that the Sinaloa and Jalisco specimens are more widely differentiated from *clarus* than are those from Sonora. Thus the dorsal saddles in the former are brown rather than black; they extend more onto the ventrals, and are less stippled with light spots in the lateral areas. The Sinaloa specimens have fewer ventrals.

Relationships with Other Subspecies.—Without doubt *antonii* is most closely related to *clarus*, with which it intergrades in northern Sonora. It differs exten-

sively in pattern from *lecontei* and *tessellatus,* having fewer and wider blotches than either, and lacking the spotted interspaces of those two species. Nevertheless, it may intergrade with *tessellatus* across Durango, although no specimens are at present available from that state.

While *antonii* and *clarus* have much in common with respect to pattern, specimens from the regions where each is most typical differ in a number of ways. Fundamentally, *antonii* has fewer body blotches than *clarus;* also, the interspaces are narrower, in proportion to the dark blotches, in *antonii* than in *clarus.* In *antonii* the blotches are dark-brown, while in *clarus* they are black; however, it is possible that this may have resulted from differences in preservation methods. I have not seen live specimens of *antonii.* The ventrals in *clarus* are usually clear, except where the lateral secondary blotches touch their outer ends; *antonii,* on the other hand, is much mottled below. The dorsal blotches in both are laterally spotted with white in the scale centers; these spots are evident higher up on the sides in *clarus* than in *antonii;* for the former usually has 7 or fewer mid-dorsal rows unspotted, while the latter has 9 or more. The head in *antonii* is darker than in *clarus,* with a greater area marked with black, and with less contrast between the light and dark areas. Thus in *antonii* the frontal is usually all dark and the chin-shields are edged with black; the contrary is the case in *clarus.*

Antonii has a lower average ventral count than *clarus;* the difference is almost without overlap, and is highly significant statistically.

Locality Records.—Antonii has been collected at the following places in Mexico:

Jalisco: (indefinite locality).

Nayarit: San Blas (type locality).

Sinaloa: Culiacan, Escuiñapa.

Sonora: 5 mi. from Guaymas, Papago Tanks (Pinacate Mts.), North Sonora (indefinite). Intergrades with *clarus* are available from the vicinity of Nogales, Santa Cruz County, Arizona.

Hemipenes

The hemipenes of *lecontei lecontei* are rounded, and forked only slightly at the end. The sulcus is single, crossing to the right lobe in either half-organ; thus the two half-organs are asymmetrical, the sulcus being on the posterior lobe on one side and on the anterior on the other. The proximal half of the shaft contains a considerable number of tiny spines, apparent only when the edge is viewed against the light. Above this almost smooth shaft there is a sudden transition to a spinous area occupying the distal half. The spines are fairly large, recurved, and closely set, the bases being almost touching. While not in regular rows, about 13 to 19 spines constitute a complete set around. The largest spines are near the proximal edge of the spinous section; distally the spines gradually change to calyces and the bilobed section is largely calyculate. The calyces are fringed with small spines. The calyces terminate abruptly, forming a border of an irregular smooth area at the end, this area being wider on the smaller or

secondary lobe than on the larger on which the sulcus terminates. The spread of the two lobes is about twice the diameter of the proximal shaft.

In *clarus* the large spines extend more nearly to the distal end, with fewer calyces. The proximal shaft points are smallest in the coastal *lecontei*.

Tessellatus differs from *lecontei* and *clarus* in having the major spines less thickly set, and there is a more gradual transition from the almost spineless distal shaft to the main spines of the outer section.

SUMMARY OF SUBSPECIFIC DIFFERENCES

Such of the subspecific differences as lend themselves to tabulation are set forth in the attached table. The differences and trends are discussed under the headings of morphology, scutellation, and pattern.

Morphological Differences.—The principal subspecific differences are in the shape of the snout and the proportionate tail length. In both of these characteristics *lecontei* and *tessellatus* are at opposite extremes, and these two forms also seem to be most widely separated in hemipenial characters. *Tessellatus* has a proportionately longer tail than *lecontei,* and also a sharper and more upturned snout, with a more prominent rostral. In these characters the other two subspecies are intermediate, but *clarus* leans toward *lecontei,* and *antonii* toward *tessellatus.*

Scutellation Differences.—In scale counts *clarus* and *antonii* are at opposite extremes, with *lecontei* and *tessellatus* intermediate; for *clarus* has the highest ventral scale counts and *antonii* the lowest. However, *tessellatus* has the highest number of subcaudal scales, no doubt the result of having a proportionately longer tail. *Antonii* and *tessellatus* show some tendency toward higher supralabials, while *lecontei* and *clarus* have an opposite tendency. The other head scales do not differ amongst the subspecies to an extent worthy of comment. The ventral scale differences between the several subspecies are significant, but are not useful in a key, since there is much overlapping.

Pattern Differences.—*Lecontei* and *tessellatus* are much alike in pattern; *antonii* is at the opposite extreme, with *clarus* intermediate but tending toward *antonii.* In number of blotches these differences (except between *lecontei* and *tessellatus*) are all highly significant and are useful for key purposes, although not unfailing. If accessory details are included, such as the presence and nature of secondary blotches, the presence of red, the spotting of interspaces and ventrum, head marks, etc., there will not be much difficulty in separating *lecontei* (or *tessellatus*) from either *clarus* or *antonii.* In some items of pattern (but not in number of blotches) *clarus* is more distinctly separated from *lecontei* than is *antonii.*

From a geographical standpoint *clarus* is the least satisfactory subspecies since specimens of this form are found scattered through a considerable *lecontei* territory. The situation is not the same as that of the dual-patterned king snakes (*Lampropeltis getulus californiae*) of San Diego County; for with these there is no territory in which the striped pattern is found where the ringed pattern is

absent, although there is a large area where the ringed snakes occur, but no striped snakes.

In *lecontei* territory there are large areas where this subspecies occurs without contamination with *clarus;* similarly there is an area (the western part of the Colorado Desert) where *clarus* is only rarely contaminated by *lecontei.* But there are fairly large areas where *lecontei* predominates and an occasional *clarus* is found; and a narrower belt wherein *clarus* predominates and an occasional *lecontei* or *lecontei*-intergrade occurs. It may be suggested that these two forms were once territorially separated until they had become distinct, but have now recontacted and are spreading through each other's territories, without completely merging into an intermediate pattern.

Ecological and Field Notes

The notes which are gathered here refer to the subspecies *lecontei* and *clarus;* since the latter was not previously recognized as a separate form it is now impossible to segregate most of the observations between the two. It is to be assumed that much of the data on time and temperature of activity apply to *clarus,* rather than *lecontei,* since they were accumulated in the Borego area of San Diego County, a region inhabited by *clarus.*

I have not seen *antonii* alive and have had no field experience with *tessellatus.* It was noted that, in captivity, a snake of the latter subspecies spent more time unconcealed on the surface than did specimens of *lecontei* and *clarus* in the same box.

In the southwest, *Rhinocheilus* is largely, but not entirely, nocturnal. In 51,639 miles of daylight travel in San Diego County, only one was seen alive on the road, compared with 122 found run over. (The normal ratio of live to dead *diurnal* snakes encountered on the road in daylight is one to ten). On the other hand, in 3,784 miles of night travel (in the desert only) 16 specimens of *Rhinocheilus* were found alive and only 6 run over. Altogether 57 have been found active on the road at night, and only one in the daytime, and this with much less night than daylight driving. The following is the time distribution of specimens collected alive at night on the desert (not restricted to San Diego County) :

Time	*Number*
7:00– 7:29	4
7:30– 7:59	5
8:00– 8:29	11
8:30– 8:59	12
9:00– 9:29	5
9:30– 9:59	3
10:00–10:29	4
10:30–10:59	1
11:00–11:29	2
	47

The lack of specimens in the late hours is more the result of the inactivity of the collector than of the snakes; however, considerable collecting was done as late as 10:30 and the falling off in specimens seen indicates a higher activity in the early evening hours. This is no doubt because of the early cooling of the desert in the spring nights, the time of year when the snakes are most active.

The temperatures at which *Rhinocheilus* has been found active at night on the desert were as follows:

Temperature (Deg. F.)	*Number*
62–3	2
64–5	2
66–7	4
68–9	2
70–1	5
72–3	2
74–5	2
76–7	3
78–9	2
80–1	3
82–3	3
84–5	1
86–7	1
	32

The species seems to be somewhat less affected by low temperatures than is *Phyllorhynchus decurtatus perkinsi*, but is probably not better able to withstand cold than *Crotalus cerastes*. They are often out when the wind is blowing strongly.

The months of activity are indicated in the following table:

Month	*Specimens found alive in the desert*	*Specimens from all sources San Diego County only*
January		2
February		1
March	1	9
April	9	36
May	34	136
June	9	77
July		34
August		18
September	4	11
October		3
November		1
December		2
	57	330

From these data there appears no doubt that May is the month of greatest activity of *Rhinocheilus,* as is the case with the majority of our southwestern snakes.

The following table shows the character of the road borders where specimens have been noted on the road either dead or alive:

Pond, creek, river bank	2
Orchard, vineyard	4
Cultivated field	10
Uncultivated grass	41
Light brush	12
Heavy brush, chaparral	38
Trees, forest	1
Rocks, boulders	19
Rocky desert	2
Brushy desert	41
Sandy desert	1
Barren desert	4
	175

It will be seen that this snake prefers grass or brush on the coastal side of the mountains, and a brush cover on the desert side. While it is not absent in rocky or sandy areas, it does not particularly seek them, as do some of our southwestern species.

In San Diego County the specimens noted during the past 17 years have been distributed amongst the regional zones as follows:

Coastal	119
Inland valleys	89
Foothills	62
Mountains	1
Desert Foothills	40
Desert	16
Uncertain	3
	330

In this table the cismontane areas are probably somewhat over-represented because of their greater accessibility. It is evident that *Rhinocheilus* does not favor the mountain area. A specimen from near Julian was the only one reported from the mountains; in this San Diegan region the species seldom, if ever, occurs above the 4000 ft. contour. These 330 specimens comprise 2.4 per cent of the 13,725 snakes of all kinds recorded from this county during these 17 years.

A few detailed field notes follow:

A specimen found December 13, 1926, was unearthed in plowing. Another was plowed out on February 14, 1940.

On June 5, 1927, a specimen was observed on a paved highway wriggling violently but making slow process because of the smooth surface. Before it could be secured it was run over by four cars. It was an early visual example of how seldom a snake crossing the road escapes where the traffic is heavy.

On April 24, 1932, on the road near Sloan, Nevada, at 8:30 on a cold windy night, a specimen of *lecontei lecontei* was observed facing a mouse which was hopping slowly on the road a few feet away. The lights disturbed the pair so that it was impossible to tell whether the snake was actually in search of prey.

At 10:01 P. M. with a temperature of 82° F. a specimen was observed on the edge of the road at Whitewater, Riverside County. As it reached the smooth surface of the road the gale which was blowing at the time blew the snake clear across the road.

A specimen collected on June 3, 1933, contained 8 eggs about 20x7 mm. Two specimens 612 and 615 mm. long each contained 5 eggs; one 672 mm. contained 7 and another 678 mm. contained 9. Conant and Downs (Zoologica, Vol. 25, p. 41) report on a specimen which laid 6 eggs about July 1. The dimensions were about 36x16 mm. and the weight 6½ g.

The young are hatched about the last week in August, for this is when the young of the year first appear.

Snakes of this species are not ill natured. Occasionally they will bite but not so readily as many other colubrids. They vibrate their tails when annoyed. The juveniles will both bite and vibrate their tails; they strike quite fiercely and their teeth can be felt.

In captivity *Rhinocheilus* will burrow in sand and may remain buried for a considerable time, either with or without the snout protruding. If alarmed when emerging from the sand, and only the fore part of the body is out, they will pull backward into the sand and disappear. But they are not nearly as consistent burrowers as *Sonora occipitalis, Phyllorhynchus decurtatus perkinsi,* or *Chilomeniscus cinctus,* for if rocks be available they prefer to hide in the crevices rather than burrow.

In captivity they feed readily on lizards, and have been observed to eat *Coleonyx variegatus* and *Uta stansburiana.* One ate a *Sonora occipitalis.*

Examination of field-collected specimens has shown that both mammals and lizards are eaten. One of the mice was identified as *Dipodomys merriami simiolus.* Two specimens were found to have eaten desert whip-tail lizards, *Cnemidophorus t. tessellatus.* Another specimen contained two lizard eggs and a grasshopper.

About 63 per cent of the specimens in collections are males, and 37 per cent females. It is not thought that this represents a true sex ratio in the wild population; the collected samples are no doubt stratified by the different habits of the sexes, as has been found to be the case with the rattlesnakes.

SUMMARY OF SUBSPECIES OF *RHINOCHEILUS LECONTEI*

		Lecontei	*Tessellatus*	*Clarus*	*Antonii*
Specimens available		235	79	78	15
Ventrals, males,	range	190–217	191–209	195–218	195–203
	interquartile range	203.0–209.6	197.4–202.6	205.6–212.8	197.4–201.9
	mean	206.28∓.43	200.00∓.57	209.17∓.77	199.6∓1.44
	coefficient of variation, %	2.73	1.94	2.56	1.61
females,	range	186–212	181–203	198–213	193–204
	interquartile range	197.5–205.2	191.9–199.1	202.5–208.1	195.3–200.3
	mean	201.31∓.66	195.48∓1.03	205.31∓.82	197.8∓1.15
	coefficient of variation, %	2.83	2.75	2.04	1.84
Subcaudals, males,	range	48–60	50–61	50–58	48–54
	interquartile range	50.1–52.8	52.4–56.2	51.8–54.4	49.2–52.4
	mean	51.45∓.19	54.33∓.41	53.07∓.30	50.80∓1.07
	coefficient of variation, %	3.89	5.16	3.61	4.70
females,	range	41–51	43–54	42–49	42–50
	interquartile range	43.8–46.7	47.4–50.8	44.6–47.5	43.9–46.8
	mean	45.28∓.26	49.08∓.50	46.07∓.40	45.33∓.73
	coefficient of variation, %	4.78	5.18	4.65	4.81

SUMMARY OF SUBSPECIES OF *RHINOCHEILUS LECONTEI* (Continued)

		Lecontei	*Tessellatus*	*Clarus*	*Antonii*
Supralabials,	range	6–9	7–9	7–9	8–9
	per cent below 8	5.7	3.4	2.0	–
	per cent above 8	3.8	5.5	4.0	6.7
Infralabials,	range	8–11	8–11	8–10	9–10
	per cent below 9	4.8	10.6	9.8	–
	per cent above 9	18.8	10.6	18.3	3.3
Average ratio, blotches to interspaces		1½	1½	2	4
Body blotches,	range	20–48	18–35	16–27	14–23
	interquartile range	26.7–31.7	23.0–28.4	20.0–23.0	15.3–18.7
	mean	29.21∓.26	25.72∓.46	21.51∓.26	16.95∓.51
	coefficient of variation, %	12.80	15.38	10.53	14.81
Tail rings,	range	6–16	6–17	5–11	3–7
	interquartile range	8.8–11.1	8.4–11.4	6.7–8.4	4.4–6.1
	mean	9.96∓.12	9.90∓.26	7.53∓.16	5.14∓.33
	coefficient of variation, %	16.85	22.63	17.09	24.00
Rostral tipped up		No	Yes	No	Slightly
Adult tail length in per cent of body length, males, range		13.2–14.9	13.5–16.6	13.8–15.4	–
	mean	14.0	14.9	14.6	14.4
females. range		12.1–14.0	12.4–14.8	12.3–13.9	–
	mean	13.0	13.6	13.2	13.3

Key to the Subspecies of *Rhinocheilus lecontei*

1 a. Black (or dark-brown) dorsal body blotches, excluding those on the tail, usually 17 or less; longitudinal extent of the dorsal blotches (at mid-body) 3 or more times the interspaces
R. l. antonii

Sonora, Sinaloa, Nayarit, and Jalisco, Mexico. Intergrades with *R. l. clarus* in northern Sonora.

1 b. Black (or dark-brown) dorsal body blotches, excluding those on the tail, usually more than 17; longitudinal extent of the dorsal blotches (at mid-body) less than three times the interspaces* 2

2 a. Snout sharper and with a distinct upward tilt toward the point; rostral raised appreciably above the nasals and internasals
R. l. tessellatus

Nuevo Leon and Coahuila, Mexico; Texas west of Long. 97°, western Oklahoma, southwestern Kansas, central and southern New Mexico. Intergrades with *R. l. lecontei* in southwestern New Mexico and southeastern Arizona.

2 b. Snout blunter and without a distinct upward tilt toward the point; rostral raised only slightly or not at all above the nasals and internasals 3

3 a. Black dorsal body blotches, excluding those on the tail, usually 25 or more; lateral areas between the primary dark blotches heavily mottled or spotted with black (may be faint in juveniles); red usually present in the interspaces; ground color cream
R. l. lecontei

From Mendocino and Lassen Counties, California, southward to northern Lower California; southwestern Idaho, central and southern Nevada, southwestern Utah, and western and southern Arizona.

3 b. Black dorsal body blotches, excluding those on the tail, usually less than 25; lateral areas between the primary dark blotches immaculate, faintly punctated, or marked with a single series of secondary spots at the edges of the ventrals; red usually absent in interspaces; ground color white *R. l. clarus*

* Occasional specimens of *R. l. clarus* have fewer than 18 blotches, or *antonii* may have more than 18. Such specimens of *clarus* may be distinguished from *antonii* by their having more vivid color contrasts in the spotting on the snout; fewer than 8 mid-dorsal black scale rows unspotted with light at mid-body; little or no mid-ventral dark blotching; and usually more than 202 ventrals.

The Colorado Desert (including the Coachella Valley) in southern California, and the adjacent mountain slopes to the west, but excluding the irrigated areas of the Imperial Valley and around Yuma, Arizona. Occasionally found interspersed with *R. l. lecontei* in southern Nevada, the western Mohave Desert, and in the Wickenburg-Tucson area of southwestern Arizona. Intergrades between *clarus* and *lecontei* are found in the desert foothills surrounding the *clarus* area. *Clarus* intergrades with *antonii* in extreme northern Sonora, Mexico.

ACKNOWLEDGMENTS

I wish to express my thanks for the loan of much valuable material to the following individuals and institutions: Mr. Charles M. Bogert, American Museum of Natural History; Dr. Charles T. Vorhees and Mr. Lee W. Arnold, University of Arizona; Mr. O. N. Arrington; Dr. Leo T. Murray, Baylor University Museum; Mr. R. K. Grater, Boulder Dam Recreational Area; Dr. Vasco M. Tanner, Brigham Young University; Mr. J. R. Slevin, California Academy of Sciences; Mr. M. Graham Netting, Carnegie Museum; Dr. Howard K. Gloyd, Chicago Academy of Sciences; Mr. Harold Trapido, Cornell University; Mr. James Deuel; Messrs. Karl P. Schmidt and Clifford Pope, Field Museum of Natural History; Dr. Edward H. Taylor, University of Kansas; Dr. Howard R. Hill, Los Angeles Museum; Mr. Stanley Mulaik; Mr. Robert Housholder; Mr. Adrian Vanderhorst; Mr. Albert J. Kirn; Dr. Thomas Barbour, Museum of Comparative Zoölogy; Mr. Thomas Rodgers, Museum of Vertebrate Zoölogy; Mrs. Helen T. Gaige, University of Michigan; Dr. A. I. Ortenburger, University of Oklahoma; Dr. R. D. Harwood, San Diego State College; Mr. Earl Sanders; Dr. George F. Myers and Miss Margaret Storey, Stanford University; Drs. Leonhard Stejneger and Doris M. Cochran, United States National Museum, and Mr. Harold Woodall. The following have furnished valuable information on particular specimens: Dr. Thomas Barbour, Dr. E. R. Dunn, Dr. Hobart M. Smith, Mr. Wilmer Tanner, and Mr. F. Angel.

Scale counts and measurements were made by Messrs. Charles E. Shaw and James Deuel. I was assisted in statistical computations by Mrs. Elizabeth Leslie. The photographs were taken and the map prepared by Mr. Leslie C. Kobler. As usual, I have received many useful suggestions from Messrs. C. B. Perkins and Clinton G. Abbott, who read the paper in manuscript.

SUMMARY

Rhinocheilus is a monotypic genus of nocturnal colubrid snakes inhabiting northern Mexico and the western United States. Four subspecies may be recognized, of which, one, *R. lecontei clarus*, is newly described. The subspecies are differentiated by variations in scutellation and pattern. The genus is characterized by the presence of undivided subcaudal plates, variability in apical scale pits (which may be either single or double), larger adult males with higher ventral scale counts than the females, and a peculiar color inversion in the pattern.

Bibliography

Baird, S. F.

1859. Reptiles (in Reports of Explorations and Surveys for a Railroad Route from the Mississippi River to the Pacific Ocean, Vol. 10), pp. 1-16, plates 24-36 (see p. 15, pl. 33).

1859. Reptiles of the Boundary (in United States and Mexican Boundary Survey, Vol. 2) pp. 1-35, plates 1-41 (see p. 21, pl. 20).

Baird, S. F. and Girard, C.

1853. Catalogue of North American Reptiles and Amphibians in the Museum of the Smithsonian Institution. Part 1—Serpents, pp. 1-172.

Barbour, T., and Loveridge, A.

1929. Typical Reptiles and Amphibians in the Museum of Comparative Zoölogy. Bull. Mus. Comp. Zoöl., Vol. 69, No. 10, pp. 205-360.

Bocourt, F. (with Dumeril, A., and Mocquard, F.)

1870-1909. Mission Scientifique au Mexique. Les Reptiles, pp. 1-1012; atlas.

Bocourt, F. and Dugès, A.

1887. Sur deux Ophidiens de la famille des Coronellidae provenant de l'Amérique intertropicale. Le Naturaliste, Ser. 2, Ann. 9, pp. 45-46.

Boulenger, G. A.

1894. Catalogue of the Snakes in the British Museum (Natural History). Vol. 2, pp. XI+382.

Conant, R. and Downs, A.

1940. Miscellaneous Notes on the Eggs and Young of Reptiles. Zoologica, Vol. 25, Part 1, pp. 33-48.

Cope, E. D.

1886. On the Reptiles and Batrachia of the Sonoran Province of the Nearactic Region. Proc. Acad. Nat. Sci. Phila., Vol. 18, pp. 300-314.

1875. Check List of North American Batrachia and Reptilia. Bull. U. S. Nat. Mus., No. 1, pp. 1-104.

1900. The Crocodilians, Lizards and Snakes of North America. Report of U. S. Nat. Mus. for 1898, pp. 153-1294.

Dugès, A.

1886. Sur le *Rhinocheilus Antonii*. Proc. Amer. Philos. Soc., Vol. 23, pp. 290-1.

1888. *Rhinocheilus antonii*, Nobis. La Naturaleza, Ser. 2, Vol. 1, pp. 13-14.

GARMAN, S.
1883. North American Reptiles, Part 1, Ophidia. Mem. Mus. Comp. Zoöl., Vol. 8, No. 3, pp. 1-185.
1884. The North American Reptiles and Batrachians. Bull. Essex Inst., Vol. 16, pp. 1-46.
1887. Reptiles and Batrachians from Texas and Mexico. Bull. Essex Inst., Vol. 19, pp. 1-20.

JAN, G.
1863. Elenco Sistematico degli Ofidi. pp. VII+143.

KLAUBER, L. M.
1931. A Statistical Survey of the Snakes of the Southern Border of California. Bull. Zoöl. Soc. San Diego, No. 8, pp. 1-93.
1939. Studies of Reptile Life in the Arid Southwest. Bull. Zoöl. Soc. San Diego, No. 14, pp. 1-100.

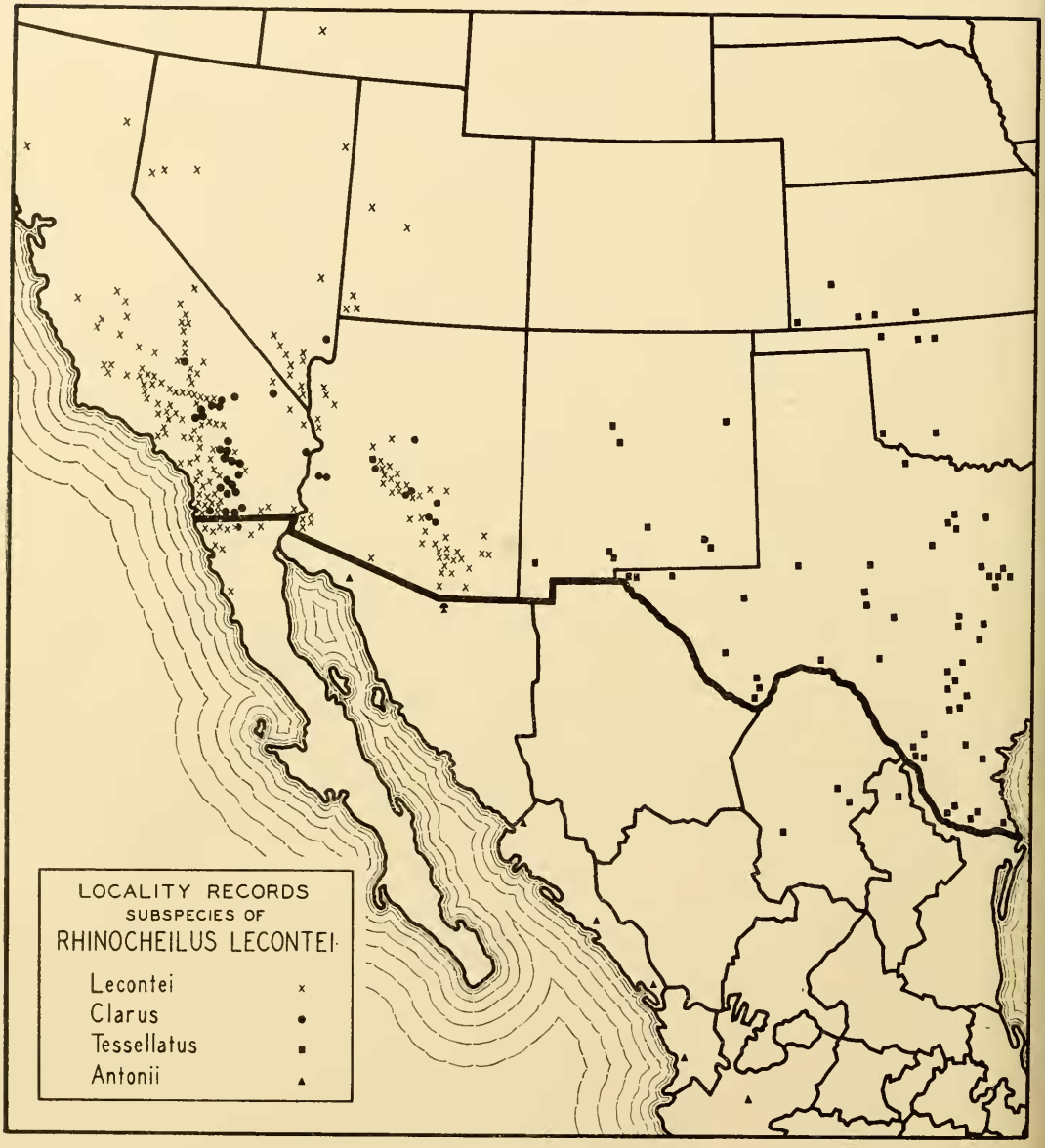
LOCKINGTON, W. N.
1880. List of California Reptiles and Batrachia Collected by Mr. Dunn and Mr. W. J. Fisher in 1876. Am. Nat., Vol. 14, p. 295.

RIDGWAY, ROBT.
1912. Color Standards and Color Nomenclature. pp. IV+43, plts. 1-53.

SCHMIDT, K. P.
1922. The Amphibians and Reptiles of Lower California and the Neighboring Islands. Bull. Am. Mus. Nat. Hist., Vol. 46, Art. 11, pp. 607-707.

VAN DENBURGH, J.
1897. The Reptiles of the Pacific Coast and Great Basin. Occas. Papers Calif. Acad. of Sci., No. 5, pp. 1-236.
1922. The Reptiles of Western North America. Occas. Papers Calif. Acad. of Sci., No. 10, Vol. 1, Lizards; Vol. 2, Snakes and Turtles, pp. 1-1028.

YARROW, H. C.
1883. Check List of North American Reptilia and Batrachia with Catalogue of Specimens in U. S. National Museum. Bull. U. S. Nat. Mus., No. 24, pp. 1-249.


LOCALITY RECORDS
SUBSPECIES OF
RHINOCHEILUS LECONTEI
Lecontei
Clarus
Tessellatus
Antonii

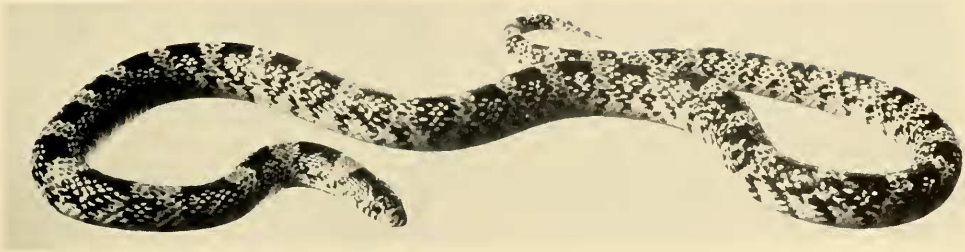


Fig. 1. *Rhinocheilus lecontei lecontei.*
Adult female, Adobe Falls, San Diego County, California.

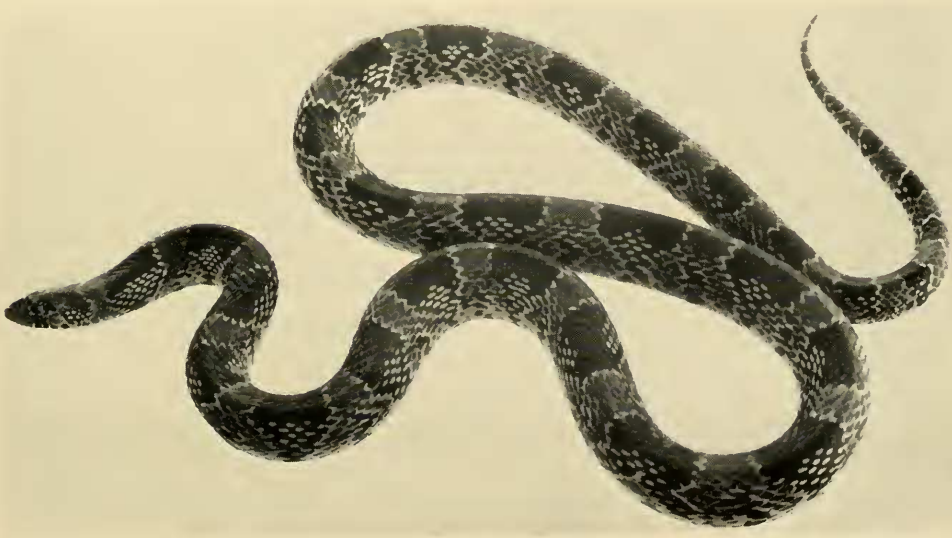


Fig. 2. *Rhinocheilus lecontei tessellatus.*
Adult male, 10 mi. west of Floresville, Wilson County, Texas.

(The darkest blotches were black in life, the intermediate dorsal spaces brilliant red).

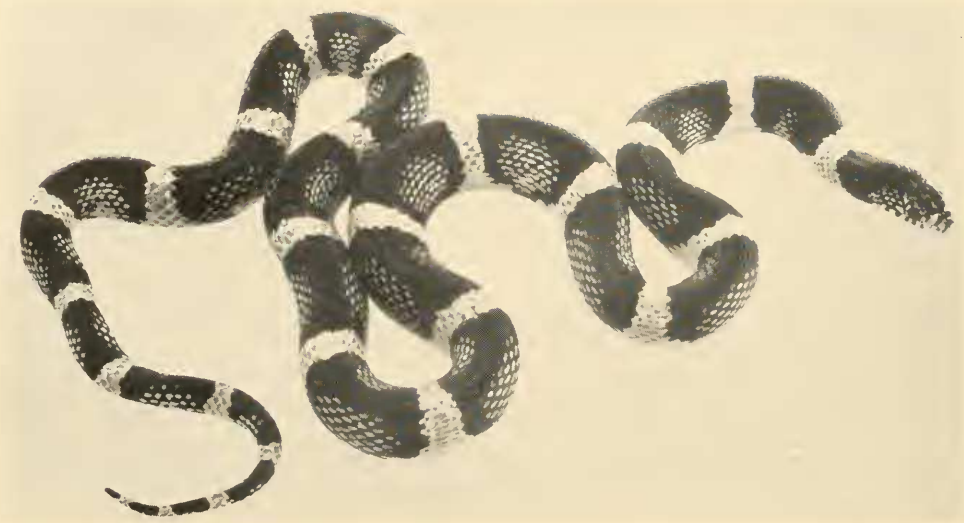


Fig. 1. *Rhinocheilus lecontei clarus.*
Adult male, Riverside County, 5 mi. south of Vidal (San Bernardino County).
(This specimen differs from typical *R. l. clarus* in having pink in the lateral interspaces).

Fig. 2. Showing normal rostral of *R. l. clarus* (or *R. l. lecontei*).
(Same specimen as Plate 13, fig. 1).

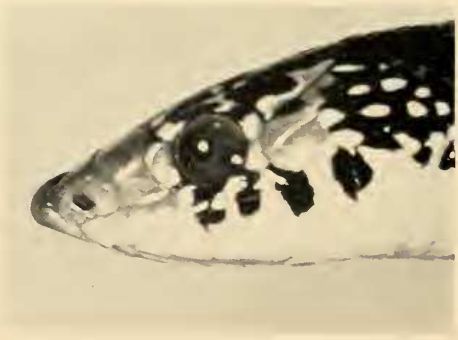


Fig. 3. Showing enlarged rostral of *R. l. tessellatus.*
(Same specimen as Plate 12, fig. 2).